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# SuSix®

## Turbidity and Suspended Solids Transmitter

# Installation and User Manual

## CE CERTIFICATE OF CONFORMITY

This product complies with the requirements concerning electromagnetic compatibility (EMC) stipulated in Council directive no. 89/336/EEC of 3rd may 1989, alteret at directive no. 92/31/EEC, on the approximation of the laws of the member states relating to electromagnetic compatibility.

## CE approvals

We declare that the SuSix® transmitter and ultrasonic sensors comply with the values stipulated in EN-61010-1 and EN 61326-1.

## Ex approval

The SuSix® sensor is approved for mounting in explosive amospheres: Ex II G3.

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# 1. Introduction

Thank you for choosing the MJK SuSix® Turbidity and Suspended Solids Transmitter. We have done our utmost to design and manufacture a quality transmitter that satisfies your requirements.

The SuSix® Transmitter, consisting of a sensor, a converter and a display, is easy to install, calibrate and put into service. However, read this manual first to get familiar with the SuSix® Transmitter and all its features.

The equipment must be handled and operated as instructed by the manufacturer, MJK Automation to ensure stable operation and accurate measurements.

The SuSix® sensor is equipped with two light-emitting diodes (LEDs, transmitters) and four emitter diodes (receivers). The readout is based on several measurements utilizing all the diodes to compensate for errors like dirt adhesion, worn diodes or scratches on the lenses.

SuSix® is available in two versions – a sensor with or without a dirt wiper and a screw thread for submerged installation in tanks or a fitting for installation in tubes. The principles for use are identical for both versions.

You can always contact your local representative or the MJK hot lines for advice and guidance:

- **Europe** Tel.: +45 45 56 06 56 E-mail: mjk@mjk.com
- **Denmark** Tel.: +45 45 56 06 56 E-mail: mjk@mjk.dk

Visit our web sites at www.mjk.com to learn more about MJK Automation, our other products and the people behind them.

SuSix® is a registered trademark of MJK Automation A/S, Denmark.

MJK Automation is a Xylem Brand

## About this Manual

This manual is divided into a table of contents, ten chapters, five appendices, four fold-out pages and one index.

**1. Introduction**

Contains a presentation of the MJK SuSix® Turbidity and Suspended Solids Transmitter, the structure of this manual and the operating principles.

**2. Safety, Repair and Product Identification**

Provide answers to issues regarding safety, mounting, repair, restrictions and product identification.

**3. Sensor Installation**

Contains installation guidelines such as correct and wrong positioning of the sensor in the liquid, min. and max. distances to walls and other solid faces, and installation in tubes.

**4. Sensor Calibration**

Turbidity measurements require no calibration, but detailed calibration procedures and flow charts for suspended solids calibration are available.

**5. Converter**

Describes the physical specifications and installation rules for the converter such as power supply, in- and outputs, sensor/converter/display configurations, etc.

**6. System Configuration Examples**

Illustrate how SuSix® Turbidity and Suspended Solids Transmitters can be interconnected with for example MJK MagFlux® flow meters in real-life scenarios.

**7. Startup**

Describes important checks and basic settings to get started including the display and keyboard user interface.

**8. SuSix® Menus**

Contains a comprehensive description of the SuSix® menus, options and utilities.

**9. Mechanical Dimensions**

Lists the SuSix® Turbidity and Suspended Solids Transmitter dimensions and specifications.

**10. Maintenance**

Procedures for cleaning the sensor, the converter, replacing wipers and functional test are described.

* * * * *

**Appendix A. Pop-up Events / Error Messages**

Lists possible pop-up messages, explains their meaning and offer solutions to error conditions.

**Appendix B. MJK-Field Link Software Upgrade**

Describes in detail how to utilise the unique and intuitive MJK-Field Link software program to upload new display and converter firmware versions.

**Appendix C. Front Panel Cut-out Drawing**

A 1:1 scale drawing of the front panel outline and cut-out area for installation and mounting purposes.

**Appendix D. Log Files**

An example log file illustrates the format and explains the entries.

**Appendix E. Digital Input/Output Connections**

Illustrates how the digital in- and outputs can be interconnected.

* * * * *

**Main Menu Overview**

A continuous presentation of the main menu structure

**Converter Setup Menu Overview**

A continuous presentation of the converter setup menu structure

**Service Menu Overview**

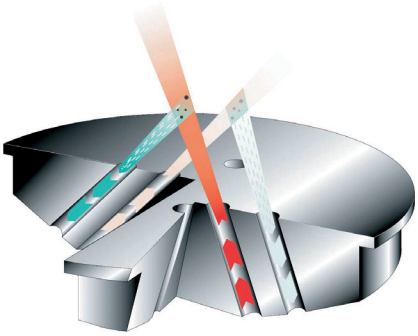
A continuous presentation of the service menu structure

**Display Configuration Menu Overview**

A continuous presentation of the display configuration menu structure

## Operating Principles

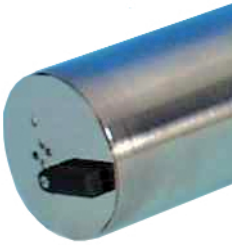
The SuSix® transmitter is an instrument for measuring turbidity and suspended solids. The transmitter consists of a sensor, a converter and a display unit.



Operating principles

The SuSix® sensor uses a patented 6-channel, multi-beam, pulsed infrared light system providing a single sensor for both turbidity and suspended solids measurement. The turbidity measurement complies with ISO standard 7027.

The advanced optical system is combined with a patented progressive algorithm using neural logic to generate a reliable high quality measurement. All of the optical systems within the transmitter is fitted with automatic self-diagnostics that ensure accurate measurements. The optical algorithm compensates for errors due to fouling or aging of the optical array, and an additional feature is a system that compensates for gas bubbles in the sample media.



Sensor with wiper

Effect of wiper

Physical fouling of the sensor head can be eliminated by an optional sensor wiper system (see pictures above).

# 2. Safety, Repair and Product Identification

## Safety instructions

- Read this manual carefully.
- Pay attention to the environment on the installation site.
- Wear necessary protective equipment and follow all current safety regulations.
- SuSix® can invoke a start signal for dangerous machinery. Always ensure that connected machinery and other equipment are effectively put out of service (that is to remove the main fuses and lock main and security switches in off-position) before commencing configuration, fault finding, servicing, maintenance work, etc.
- **WARNING**: There is a risk of lethal, electrical shock from the "Mains supply" terminals "N" and "L". Be careful not to touch these terminals while the SuSix® is being serviced.
- **WARNING:** Incorrect installation or use can lead to body injury and/or material damage!

## Physical Mounting

The SuSix® converter/display unit ***must not*** be mounted in explosion hazardous areas!

SuSix® may only be installed and commissioned by authorized MJK personnel, and all national and local regulations must be complied with.

## Repair

Repair must only be made by authorized MJK personnel or by a service representative approved by MJK.

## Product Identification

A delivery will usually consist of a SuSix® sensor and a SuSix® converter with or without a display unit.

Check that the item(s) delivered corresponds to the ordered item(s). The part number is printed on an identification label sticked onto the converter shipping box and on a label on the converter itself.

# 3. Sensor Installation

***Important!***

***To ensure safe and optimal functionality of the SuSix® transmitter, the instructions below must be followed closely.***

- The sensor must be mounted in a location where it is possible to perform a representative suspended solids measurement.
- If the suspended solids transmitter is mounted in open air, protect it against the influence of the elements using for example a rain roof.
- Fittings and mountings must be capable of carrying the transmitter's weight (approx. 5 kg), and vibrations from for example pumps and other equipment must be avoided.
- The system should be installed to facilitate access to the suspended solids transmitter operator panel and sensor without risking personal injury during normal operation, maintenance, cleaning of sensor, etc.
- The suspended solids transmitter must be connected to a mains outlet that complies with national and local regulations.
- All cables must be installed, connected and mounted to minimize mechanical impact and electrical influence from other installations.
- The sensor cable's maximum tensile load is adjusted to the sensor weight.
- The sensor is a mechanical instrument. Be careful not to damage the sensor windows. The accuracy will deteriorate, if the optics is subject to heavy pollution, or if a steel brush is used for cleaning.
- All fuses are located on the suspended solid transmitter's motherboard.

***WARNING!***

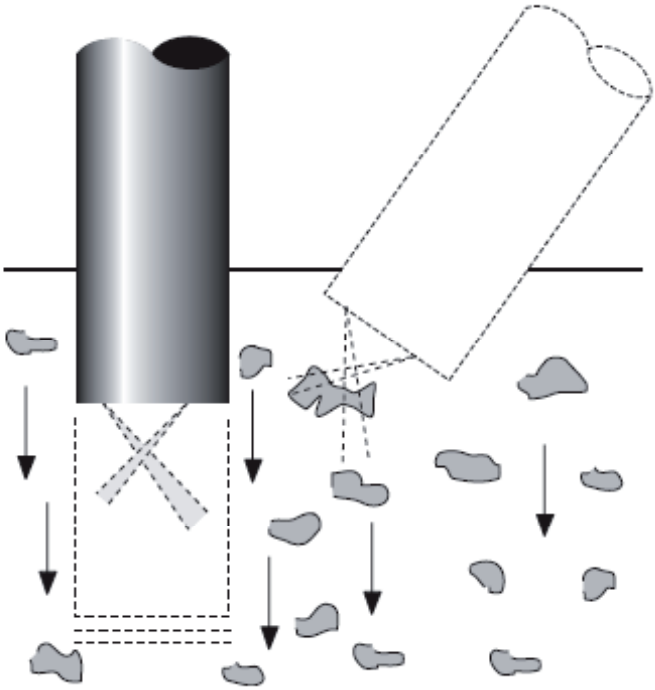
***The suspended solids transmitter must not be powered until the transmitter is correctly mounted and connected!***

***WARNING!***

***Connections to the suspended solids transmitter must not be disconnected while the transmitter is powered.***

## Motion in the liquid

The liquid has to remain in motion and mixed. It is possible to achieve this by constantly circulating the liquid, or by installing the sensor at a place with a constant flow.

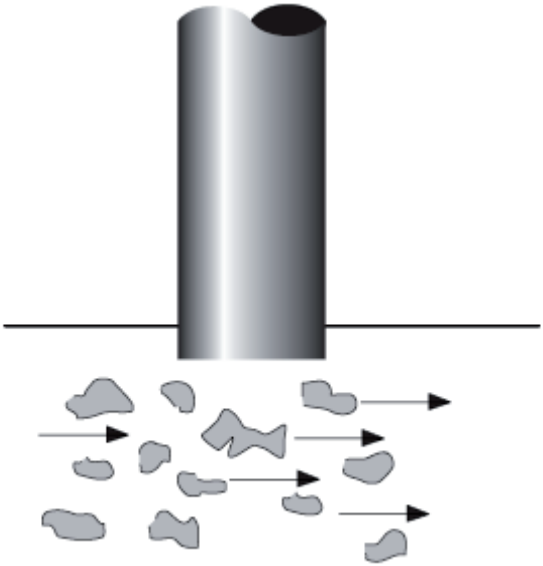


Faulty measurement due to stagnant liquid

As soon as the liquid becomes stagnant, and the suspended solids start for sedimentation, the sensor does not recognize the suspended solids anymore. For calibration in a sample bucket it is necessary to stir gently the liquid, or to constantly move the sensor in order to achieve reliable measuring results. Observe that you keep the minimum distances from the bucket walls.

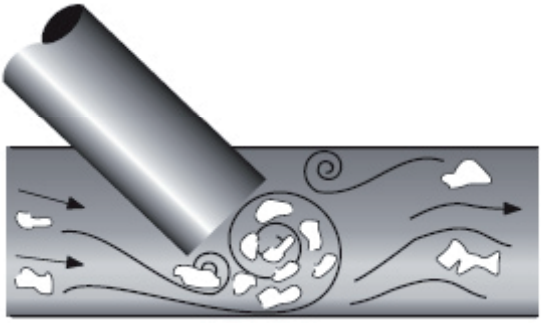
## Mounting / position

The flow direction should be parallel to the sensor surface. This prevents turbulences at the sensor head.



Correct installation

In case of low suspended solids concentration, whirls and turbulences can falsify the measuring result.



Incorrect installation!

# Mechanical installation of a submerged sensor

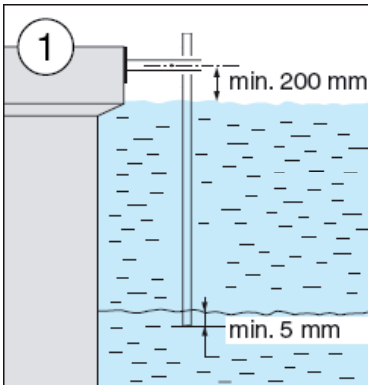
## Preparation

Select an easy-to-get-to position for a measuring point which can produce a valid and representative measuring value.

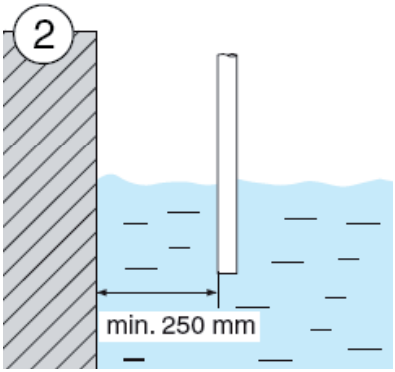
## Position of submerged sensor

The following three steps are of vital importance for getting optimal measuring values.

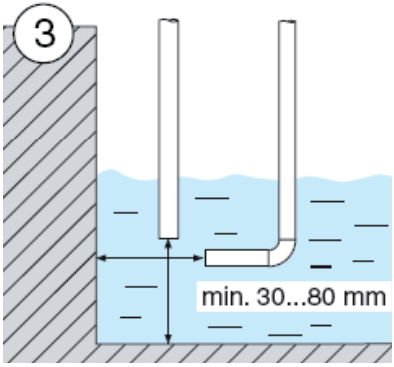
1. The sensor (the optics) must be submerged at least 5 mm in the liquid.




2. The sensor to wall distance must be at least 250 mm.



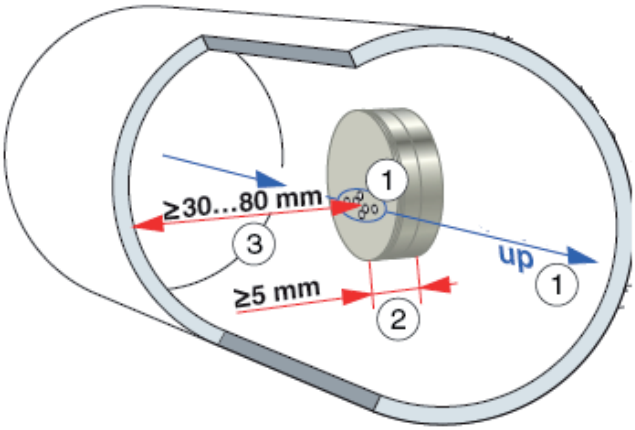
3. The distance from the sensor head (the optics) to solid faces (for example bottom and walls) must be at least 30 - 80 mm (depending on the liquid's concentration).



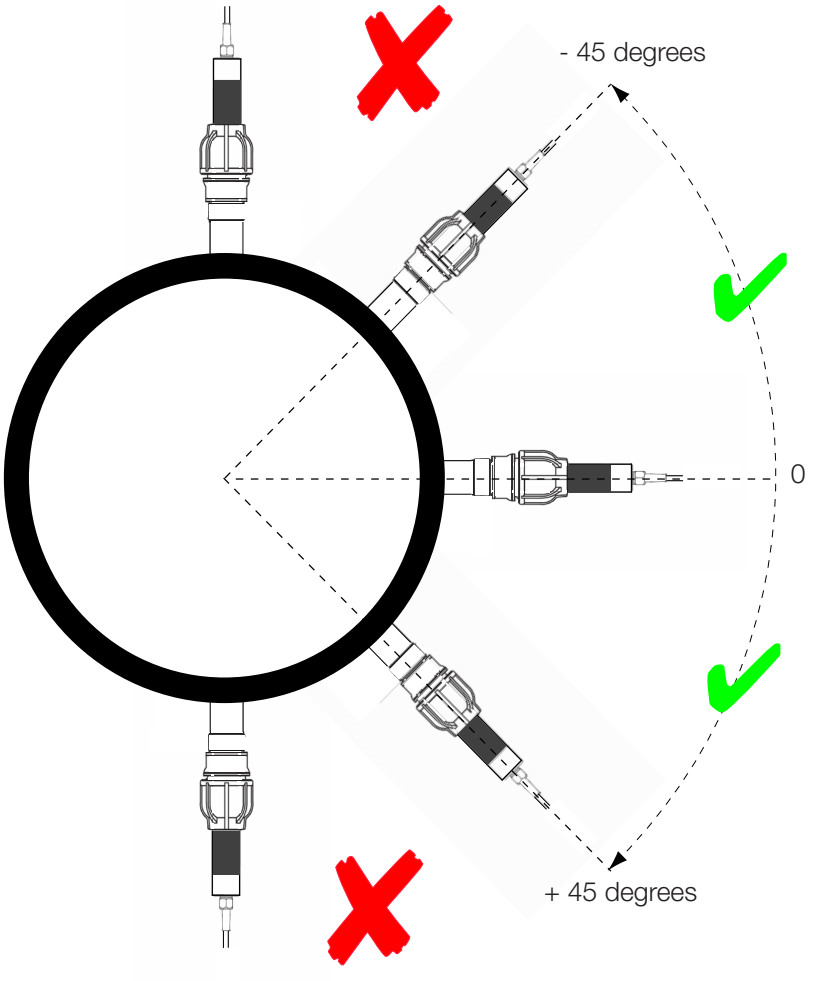

## Mechanial installation of sensor in a tube (in-line)

### Mounting guidelines

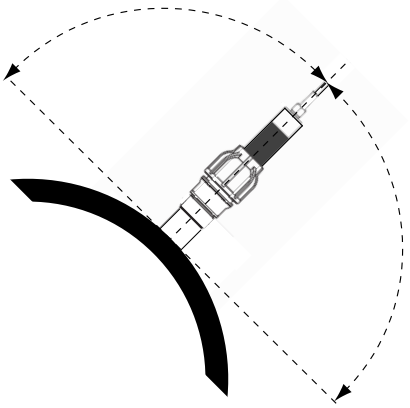
1. The optical windows row have to be arranged lengthwise to the medium flow direction (**1**).
2. Keep the minimal insertion depth >5 mm (**2**).
3. Control the minimum distance to the opposite wall. Must be >30 …80 mm depending on the concentration (**3**).



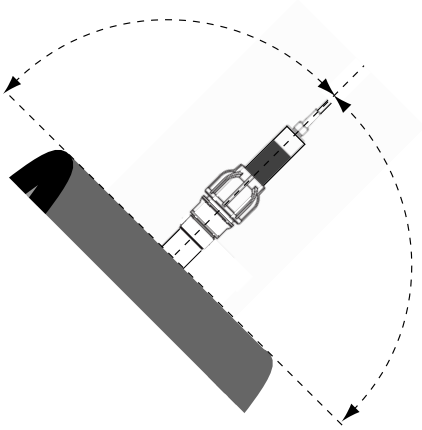
4. Make sure that the sensor is mounted within ± 45 degrees from the horizontal plane (see below).



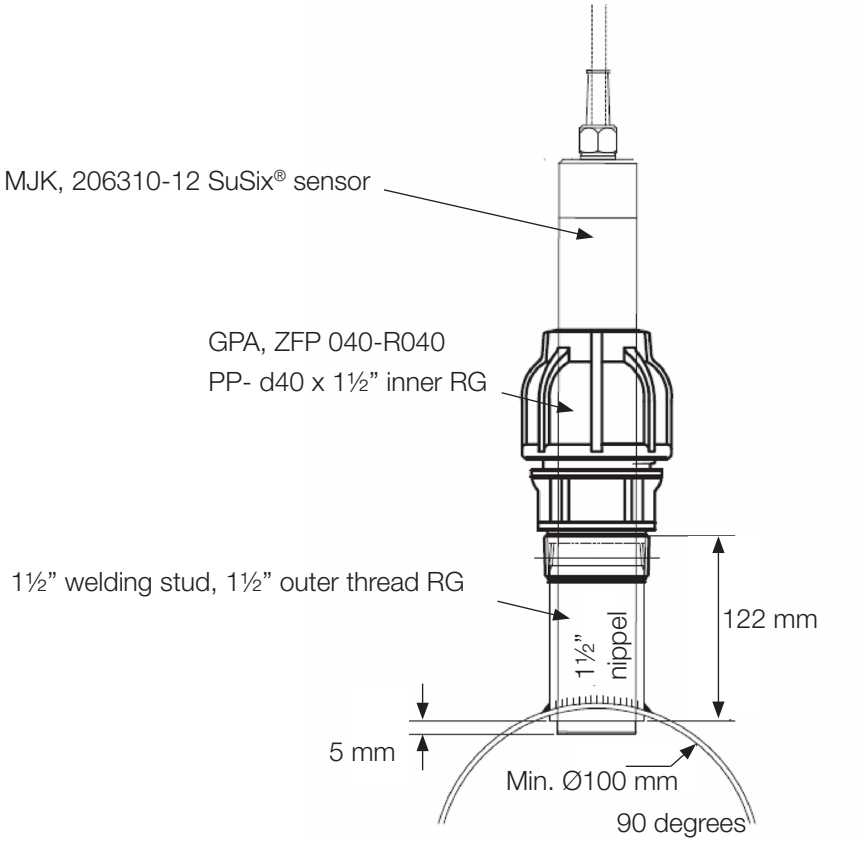
5. An in-line welding stud must be welded to the tube at an angle of 90 degrees in all directions (see below).



90 degrees



6. This drawing below illustrates a SuSix® sensor installed in an in-line clamp fitting with parts and dimensions.

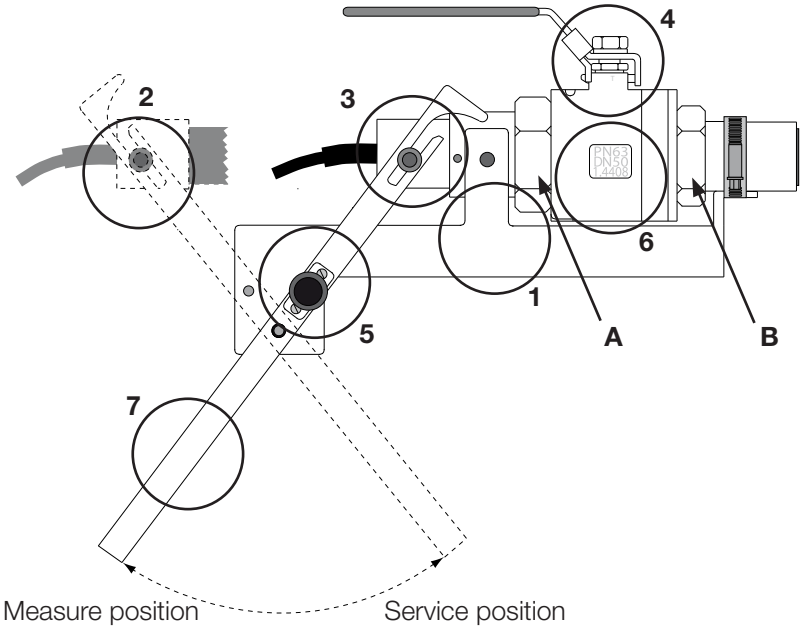


# Installation / Removal using Insertion Fitting 155210

**Warnings:** **Max. operating pressure is 6 bar (720 N).**
**Max. residual pressure when changing sensor is 1 bar (120 N).**
**The sensor guide (2) is not a safety component**
**The insertion fitting is not fully assembled from the factory**
**Be careful when dealing with corroding and toxic substances**
**Be careful when dealing with lines under pressure**

## Required Tools and Materials

- 5 mm hex key
- LOCTITE® 577 sealant




## Preparing the Insertion Fitting before welding to tube

The nuts on the ball valve housing (see A and B arrows) ***have not*** been tightened and secured with a sealant from the factory. This allows the customer to rotate, position and secure the ball valve as required on the installation site.

1. Loosen/remove the A and B nuts, and rotate the ball valve to its final position.

2. Apply Loctite 577 around the male threads (skipping the leader), tighten the A and B nuts, and allow the sealant to cure for about 72 hours (3 days) to achieve full strenght.
3. Weld the Insertion Fitting to the tube (see also pages 17 - 19).

## Installation of the Sensor

1. Set the sensor guide handle (7) in "Service" position.
2. Open the air relief valve on the underside (1) with a 5 mm hex key.
3. Carefully insert the sensor into the insertion fitting's built-in gasket (inside 6) and lead the other end into the sensor guide (2).
4. Close the air relief valve on the underside (1) with a 5 mm hex key.
5. Make sure that the residual, in-line pressure is max. 1 bar !
6. Support the sensor end piece (3) and slowly open the ball valve (4).
   ***Note: Rebounds may occur at this point !***
7. Release (pull out) the safety lock (5), and at the same time pull the sensor guide handle (7).
8. When the end piece (3) touches the insertion fitting body (6), the sensor guide handle (7) has reached its "Measure" position, and the safety lock (5) engages (falls into place) with audible click.
9. Make sure that the safety lock (5) has been engaged (in locked position).

## Removal of the Sensor

1. Make sure that the residual, in-line pressure is max. 1 bar !
2. Release (pull out) the safety lock (5), and at the same time push the sensor guide handle (7) forwards to extract the sensor from the insertion fitting body (6).
   ***Note: Rebounds may occur at this point !***
3. The sensor guide handle (7) is in "Service" position, when the safety lock (5) engages with a click.
4. Close the ball valve (4).
5. Open the air relief valve (1).
6. Support the sensor end piece (3), and carefully lift the sensor out of the sensor guide (2).
7. Close the air relief valve (1).
8. Remove the sensor.

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# 4. Sensor Calibration

## Turbidity

The SuSix® sensor is factory calibrated for turbidity measurements. No further calibration is required.

## Suspended Solids

Calibration is required prior to using the SuSix® for suspended solids measurements.

***Important!***

***Suspended solids calibration must be carried out at fixed intervals.***

If a distinct change in composition and/or colour of the process appears, the SuSix® must be re-calibrated immediately.

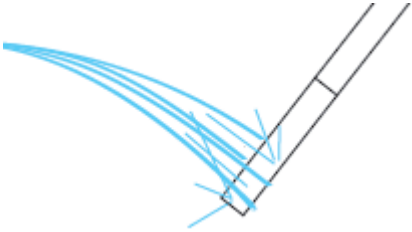
*Note: Representative measuring values can only be expected if the calibration point is obtained at a sludge concentration of more than 50% of the application's nominal range.*

Calibration may be 1-point, 2-point or 3-point as required. Normally a 1-point calibration will be sufficient.

Zero-point calibration is not required!

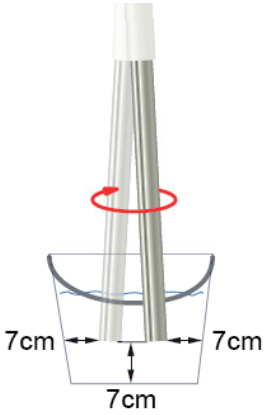
## Calibration Procedures

1. Take out the SuSix® sensor and clean it according to the directions in the section about cleaning the sensor during maintenance.



2. Extract a sample from the actual process.
   The necessary volume must be at least 10 litres. The sample is analyzed at a laboratory, and the content of suspended solids can be determined. This value must be kept as it is required later on.

3. Dip the SuSix® sensor in the sample stirring continuously, or leave it in the fluid in which the suspended solids measurement is going to take place.



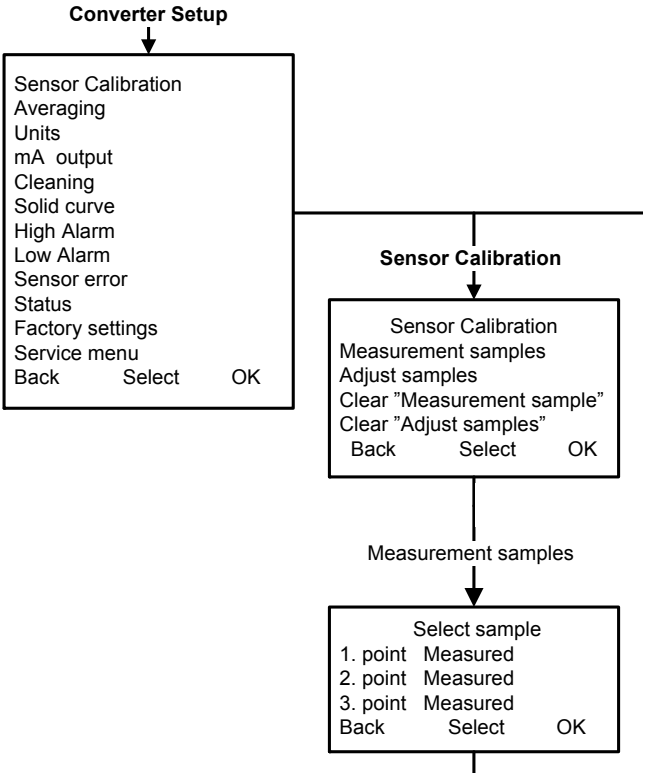

Ensure sure that the extracted sample does not sediment (deposit) by stirring continuously.

***Important!***

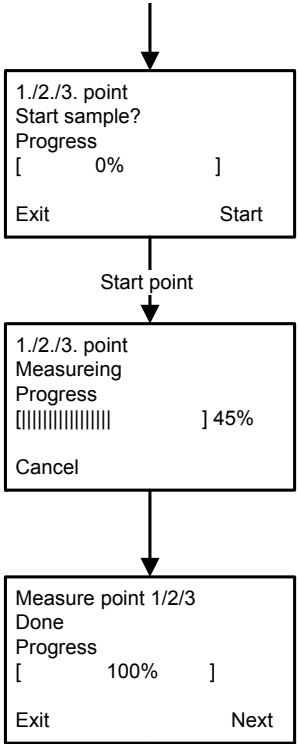
***If the signal from the suspended solids sensor changes very slowly on the display, make sure that the signal attenuation is not set too high. Check likewise in the "Averaging" menu that the response time is not set too high.***

The recommended response time is 5 seconds.

4. Proceed to “Sensor Calibration” in the “Converter Setup” menu (see below).
   Note that the options "Sensor Calibration", "Cleaning" and "Solid curve" will be marked with an "NA" (not applicable), if they cannot be selected (for example if wrong units have been chosen).

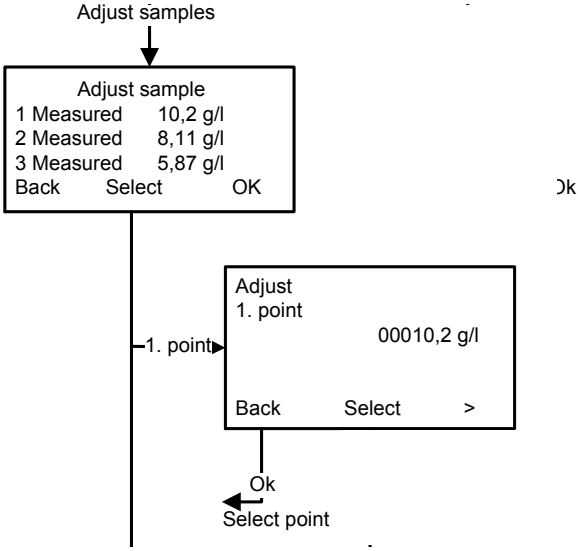



5. Select “Measurement samples”, “1. point” and close with OK.




6. Press “Start” to start loading of the actual sample’s values.
   During this process a bar graph is displayed indicating the progress from 0-100 %.

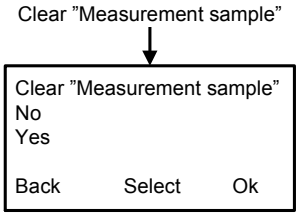
7. After data loading is finished, a realignment of the measured value with respect to the previously measured laboratory value is required.
   Select " Adjust samples" in the "Sensor Calibration" menu, select "1. point" and close with OK.



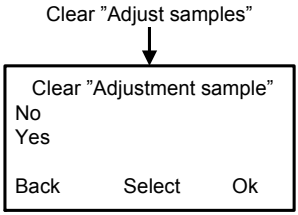

8. Select "Adjust" in "1. point" and enter the value from the analyzed laboratory sample.
   If a 2- or 3-point calibration is required, repeat the previous steps replacing "1. point" with "2. point" and/or "3. point".

## Delete Calibration

If you want to delete a calibration point (the measured value), you can do it from the ”Clear "Measurement sample"” menu.




If you want to delete an alignment point (the entered value), you can do it from the ”Clear "Adjustment samples"” menu.



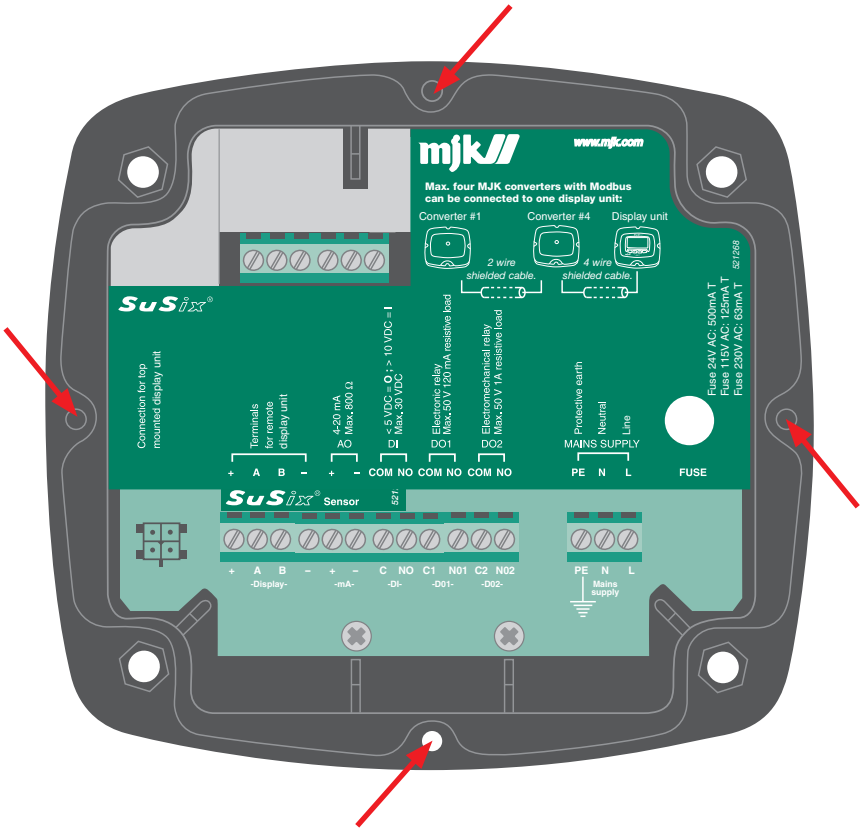
# 5. Converter

## Electrical Mounting

### Warning!

***The SuSix® converter/display unit must not be mounted in explosion hazardous areas!***

Loosen the four screws (positions indicated by arrows) and remove the display unit to gain access to the terminals.



## Power Supply

The flow converter must be supplied from a properly fused mains outlet, a 24 volt AC outlet, or a 10 - 30 V DC power supply/battery.

| Power Supply 230 V AC, 115 V AC or 24 V AC | |
|---|---|
| **Terminal** | **Designation** |
| PE | Protective ground |
| N | 230 / 115 / 24 V AC neutral |
| L | 230 / 115 / 24 V AC live |

| Power Supply 10 - 30 V DC | |
|---|---|
| **Terminal** | **Designation** |
| PE | Protective ground |
| — | DC neutral |
| + | DC live |

The internal fuse ratings are:

| Internal Fuse Ratings | | | |
|---|---|---|---|
| **Voltage** | **Rating** | **Order no.** | **Dimension** |
| 230 V AC | 0.063 mA T | 550030 | 5 x 20 mm |
| 115 V AC | 0.125 mA T | 550035 | 5 x 20 mm |
| 24 V AC | 0.5 mAT | 550049 | 5 x 20 mm |
| 10 - 30 V DC | 1.0 AT | 550051 | 5 x 20 mm |

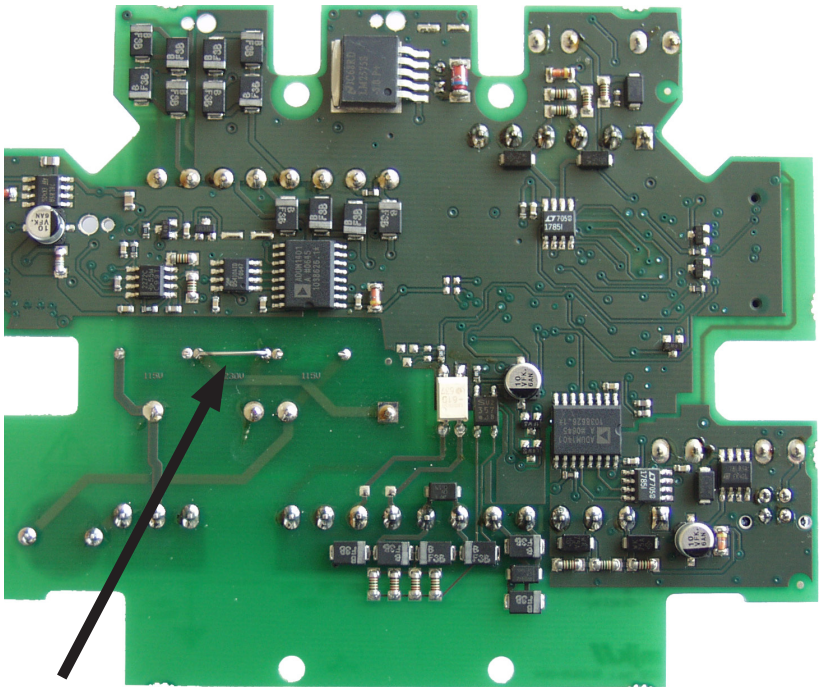
The technical specifications/requirements for a 10 - 30 V DC power supply/battery are:

| Technical Specifications for 10 - 30 V DC Power Supply | |
|---|---|
| Power consumption without display | < 5 W |
| Power consumption with display | < 8 W |
| Peak start current @12 V DC,1 second | Approx. 1,5 A |
| Peak start current @24 V DC,1 second | Approx. 1 A |

## Changing the Power Supply Voltage 230/115 V AC

To change the input mains voltage from 230 V AC to 115 V AC (or vice versa) proceed as follows:

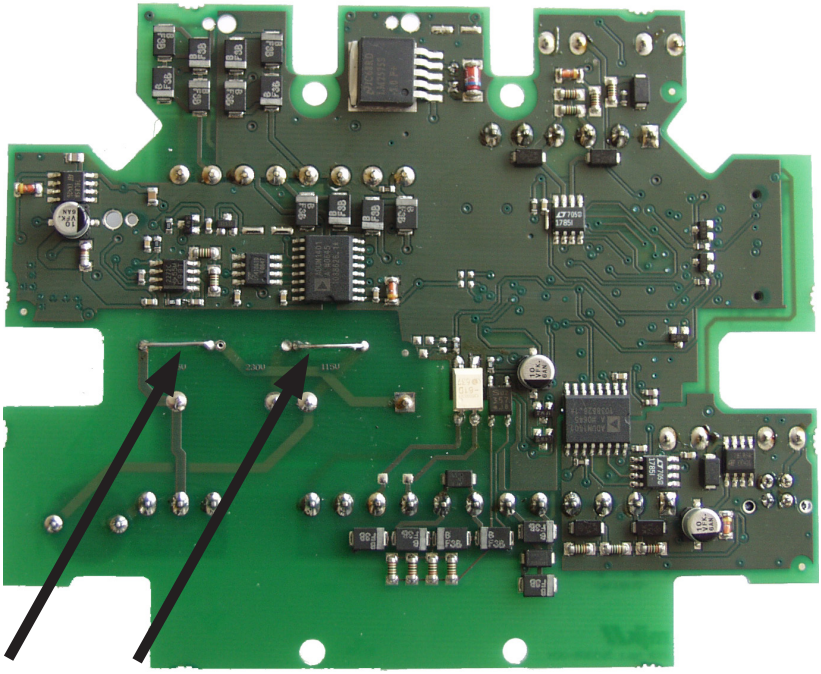
1. Loosen the four screws on the front and lift out the display (see also page 29).
2. Note down the color and position of the wires in the terminal blocks, and then loosen the terminal screws.
3. Unscrew the two screws that hold the metal cover and then remove it.
4. Unscrew the four screws that hold the mother PCB (the printed circuit board with all the electrical components).
5. Remove the mother PCB and look at the back side.
   This is what you should expect to see for a 230 V AC configuration:



230 V AC single jumper position

6. Unsolder and remove the jumper indicated by the arrow.

7. See on the following picture where two jumpers must be inserted for a 115 V AC configuration:



115 V AC dual jumper positions

8. Insert and solder 2 jumpers (wires) in the positions indicated by the black arrows.
9. Turn around the PCB and replace the 63 mAT fuse on the right side with a 125 mAT fuse ( or vice versa going from 115 VAC to 230 VAC).
10. Re-insert the PCB and re-assemble the converter (see also steps 4, 3, 2 and 1).

## Analogue Output

The analogue output is an active output with a maximum load of 800Ω.

| Analogue Output | | |
|---|---|---|
| Terminal | | Designation |
| AO | + | 4-20 mA |
| AO | - | 4-20 mA |

The analogue output can be programmed for indication of primary units.
See details on page 61.

## Digital Output

SuSix® has two digital outputs - DO1 with an opto (light triggered) relay and DO2 with an electro-mechanical relay.

They can both be programmed for the following functions:

- Sensor error
- High and low alarms

| Opto Relay | | |
|---|---|---|
| Terminal | | Designation |
| DO1 | Com | Max. 50 V DC /120 mA |
| DO1 | NO | |

| Electro-mechanical relay | | |
|---|---|---|
| Terminal | | Designation |
| DO2 | Com | Max. 50 V DC /1 A |
| DO2 | NO | |

DO1 shares the common terminal (Com) with DI.

See also application examples in Appendix E. Digital Input/Output Connections on page 111.

## Digital Input

SuSix® has one digital input which can be activated with a voltage higher than 10 V DC and de-activated with a voltage lower than 5 V DC.

| Digital Input | | |
|---|---|---|
| Terminal | | Designation |
| DI | Com | |
| DI | | Max. 30 V DC |

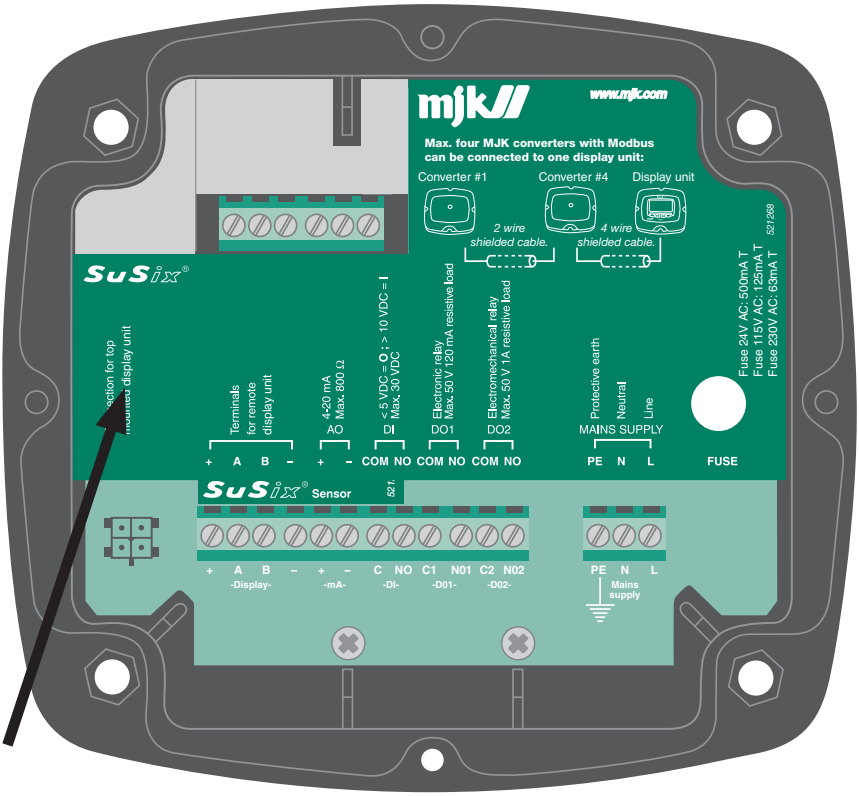
The digital input (DI) can be programmed for the following functions:

- start and pause cleaning function
- Solid curve

DI shares the common terminal (Com) with DO 1.

See also application examples in Appendix E. Digital Input/Output Connections on page 111.

## Converter Terminals



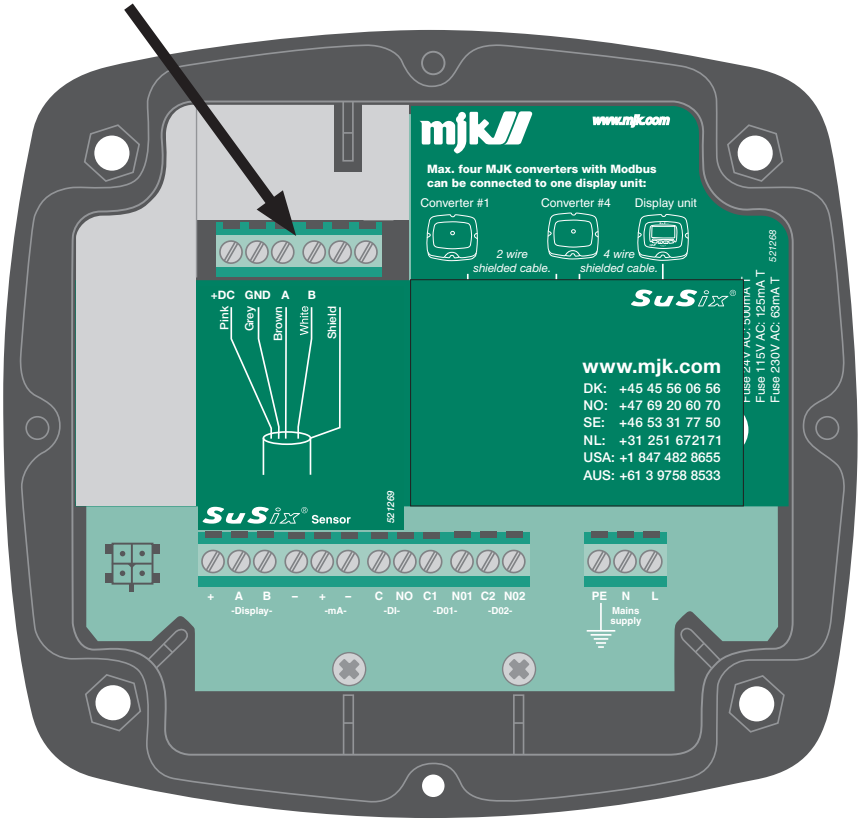

SuSix® converter terminals

Flip the green label with "SuSix®" printed on it (see arrow) to the right to gain access to the sensor connection terminals (see next page).

## Sensor and Mounting Kit / Connection Board Terminals

Connect the sensor wires to the SuSix converter (or to Mounting Kit 207030 PCB 510252 or to Connection Board 207030 PCB 510252-004) with the wires coming from the sensor as shown below (see arrow).

| Terminals | | | |
|---|---|---|---|
| **Wires from sensor** | **Converter terminals** | **Mounting Kit 207030 PCB 510252** | **Connection Board 207030 PCB 510252-004** |
| Pink | +DC | E1 | 2 |
| Grey | DC GND | E2 | 3 |
| Brown | A | L1 | 4 |
| White | B | L2 | 5 |
| Shield | Shield GND | GND | 1 |

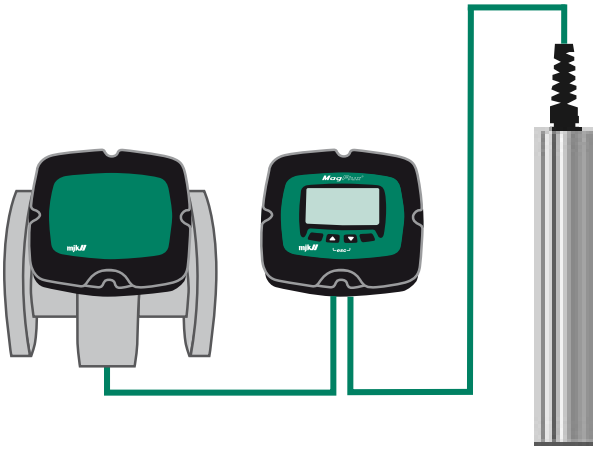



SuSix® converter terminals

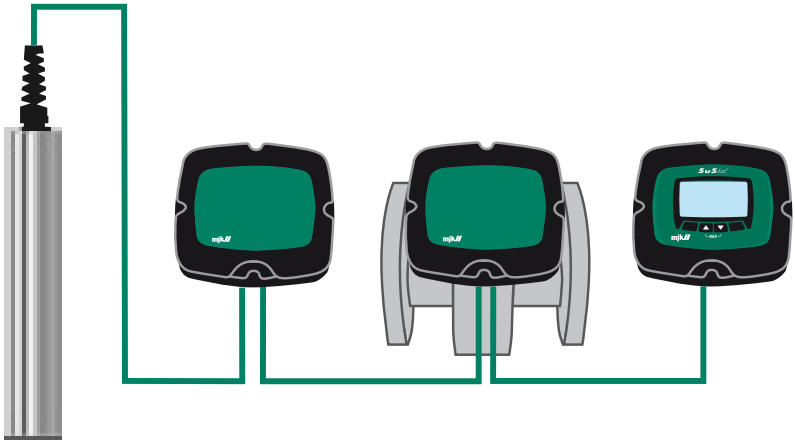
# 6. System Configuration Examples

MJK SuSix® transmitters share communication protocols with other MJK products like the MJK Magflux® flow meter and the MJK Connect data transmitter, and can also share display units. This section illustrates two configuration examples and includes cable connections and part numbers.

### Magflux® with Blind Lid and SuSix® with Display Unit

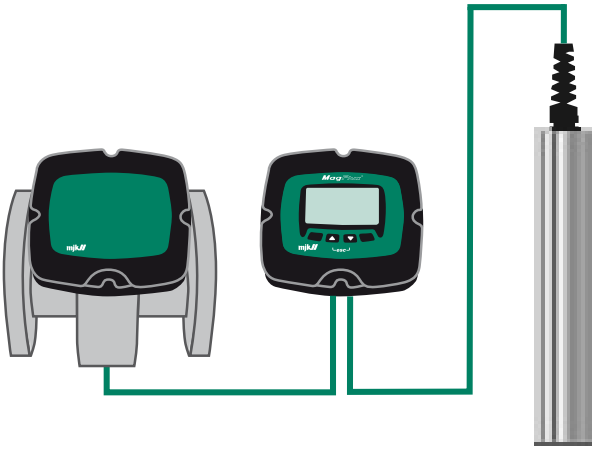


### SuSix® with Blind Lid, Magflux® with Blind Lid and a Remote Display



# Magflux® with Blind Lid and SuSix® with Display Unit

***Configuration: Magflux® flow sensor/converter with a blind lid connected to a SuSix® transmitter with display unit***



Part numbers for this configuration:

| | |
|---|---|
| 2x7xxx | ***MagFlux®*** Flow Sensor |
| 2x7791x | ***MagFlux®*** Connverter with blind lid |
| 579035 | ***MagFlux®*** Gel Potting Kit IP68 |
| | 2-wire, shielded, twisted cable (Magflux® <-> SuSix®) |
| 20631x | ***SuSix®*** Sensor |
| 206305-6 | ***SuSix®*** Connverter with Display Unit |

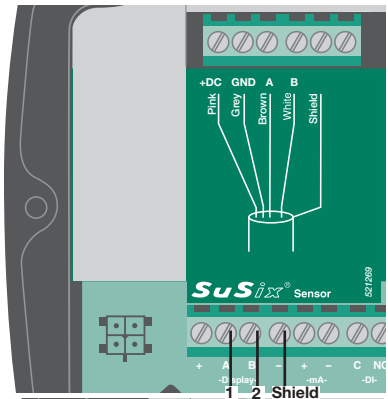
## Wiring Schematic #1

for " Magflux® with Blind Lid and SuSix® with Display Unit" from the opposite page (page 38).

### *SuSix® with Display Unit*

2-wire, shielded twisted cable

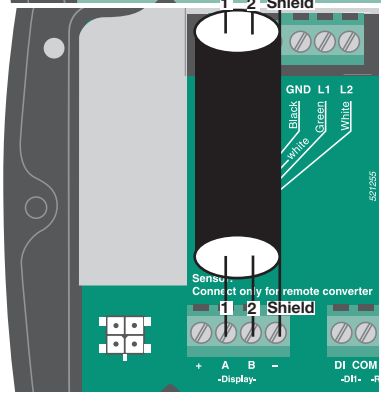
1. Connect lead "1" to slot "Display A"
2. Connect lead "2" to slot "Display B"
3. Connect the twisted shield to slot "Display -"




### *Magflux® with Blind Lid*

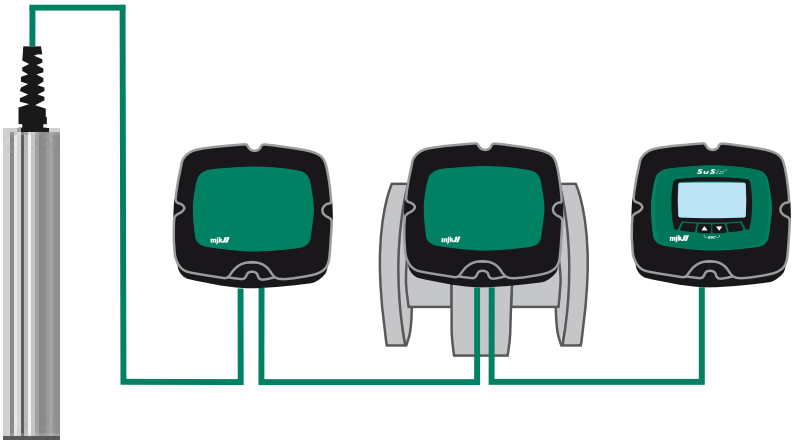
2-wire, shielded twisted cable

1. Connect lead "1" to slot "Display A"
2. Connect lead "2" to slot "Display B"
3. Connect the twisted shield to slot "Display -"



# SuSix® with Blind Lid, Magflux® with Blind Lid and a Remote Display

***Configuration: A SuSix® transmitter with a blind lid connected to a Magflux® flow sensor with a blind lid and common remote Display Unit.***



Part numbers for this configuration:

| | |
|---|---|
| 20631x | ***SuSix®*** Sensor |
| 206305-6 | ***SuSix®*** Converter |
| 2x7xxx | ***MagFlux®*** Flow Sensor |
| 2x791x | ***MagFlux®*** Converter with blind lid |
| 579035 | ***MagFlux®*** Gel Potting Kit IP68 |
| 207930 | Wall Mounting Kit |

2-wire, twisted shield cable (SuSix® <-> Magflux®)

4-wire, twisted shield cable (Magflux® <-> Display Unit)

## Wiring Schematic #2

for "SuSix® with Blind Lid and a Magflux® with Blind Lid connected to a common wall mounted Display Unit" on the opposite page (page 40).

### *SuSix® with Blind Lid*

2-wire, shielded twisted cable

1. Connect lead "1" to slot "Display A"
2. Connect lead "2" to slot "Display B"
3. Connect the twisted shield to slot "Display -"

### *Magflux® with Blind Lid*

2-wire, shielded twisted cable

1. Connect lead "1" to slot "Display A"
2. Connect lead "2" to slot "Display B"
3. Connect the twisted shield to slot "Display -".

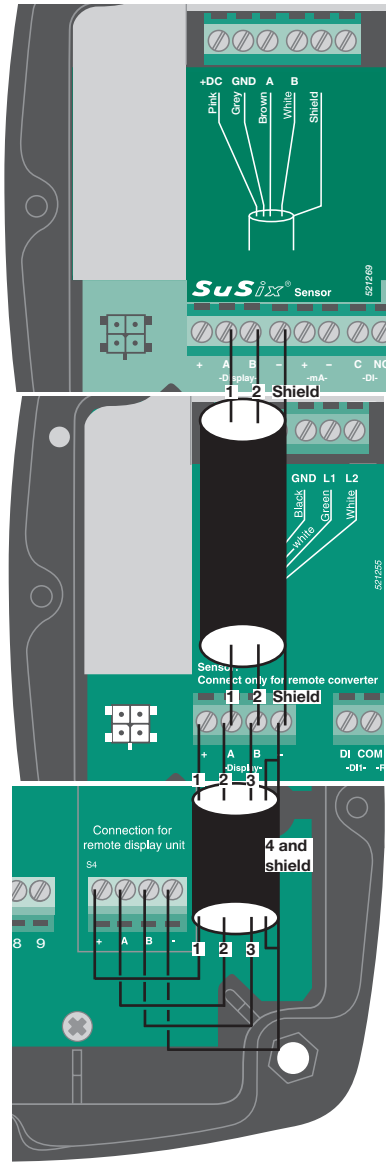
4-wire, shielded twisted cable

1. Connect lead "1" to slot "Display +"
2. Connect lead "2" to slot "Display A"
3. Connect lead "3" to slot "Display B"
4. Connect the twisted shield to slot "Display -".

### *Wall Mounted Display Unit*

4-wire, shielded twisted cable

1. Connect lead "1" to slot "Display +"
2. Connect lead "2" to slot "Display A"
3. Connect lead "3" to slot "Display B"
4. Connect the twisted shield to slot "Display -".



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# 7. Startup

## Initial Checks

Before switching on power the following steps must be checked.

1. The local mains power supply voltage corresponds to the voltage printed on the identification label of the transmitter.
2. All electrical connections are made in accordance with the electrical connection diagram shown on page 34.
3. All terminal screws are tightened.
4. All cable glands are tightly secured.
5. All grounding connections are made in accordance with the instructions in this manual (see page 23).

## Initial Measurement

1. Make sure that the sensor is completely covered by liquid.
2. Turn on power to the transmitter and wait one minute before taking the initial measurement.

## Language Selection

1. The default display language is English. If another language is required, proceed with step 2.
2. Select "Display Setup" from the Main Menu.
3. Select "Language" from the Display Setup menu and chose the required language (see page 79).

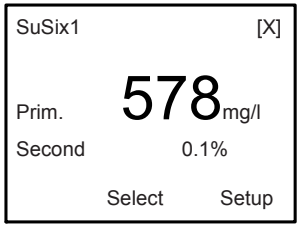
## Display Read-out, one connected unit

All ***SuSix®*** display read-outs are illustrated and described in this manual.

Chapter 6. SuSix® Menus (on page 47) gives a detailed description of the 5-line LCD screen displays shown during setup, configuration and normal operation.

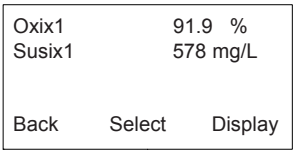
Display and keyboard for reading and programming

The display shown above will in the remaining part of this manual be stylized to appear like this:

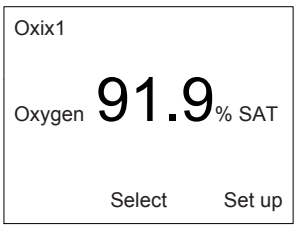


## Display Read-out, several connected units

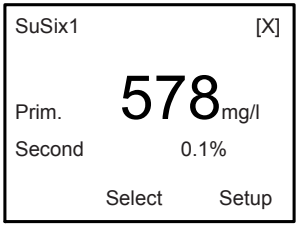
When several MJK units are interconnected, for example an Oxix® dissolved oxygen transmitter and a SuSix® turbidity and suspended solids transmitter with different names and Modbus ID numbers, a "Display Overview Menu" is available at top level (press "Back" repeatedly):




All connected units are displayed and sorted by their ID numbers, and consequently each unit can be selected and set up as required:




or




***Important:***
***More connected units can only by managed as described above, if each unit have been assigned a unique name and Modbus ID number. See page*** 81 ***for details.***

## Display Keys

The keys and the soft keys (variable key functions determined by the display firmware) are used for initial programming and normal operation of the flow meter.

The function(s) of the four available keys is displayed at the bottom of the display. The symbols and actual functions are described in detail in the sections that describe the individual menus.

### Contrast Adjustment

Adjust the display contrast by pressing the two outmost keys simultaneously (indicated by the keys) and press the up/down keys as required.

Save the new setting by pressing the two outmost keys simultaneously.

### System Reset

You can reset and refresh all system displays and key combinations by pressing all four keys simultaneously.

This feature is especially useful during for example a service call, where the display language (Dutch, Danish, etc.) cannot be understood by the local service person. A system reset immediately sets the display language to English.

The system reset must not be confused with the ultimate "Recover factory settings" (see page 68) which deletes all local configurations/settings and replaces them with default factory settings.

# 8. SuSix® Menus

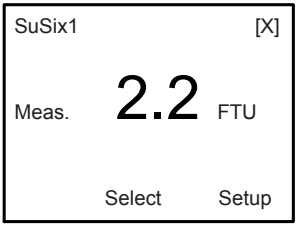
All the ***SuSix®*** menus and sub menus are shown and described in the following sections.

Continous overviews of the menu and sub-menu structures are presented at the end of this manual:

- ***Main Menu Overview*** (page 112)
- ***Converter Setup Menu Overview*** (page 114)
- ***Service Menu Overview*** (page 122)
- ***Display Setup Menu Overview*** (page 126)

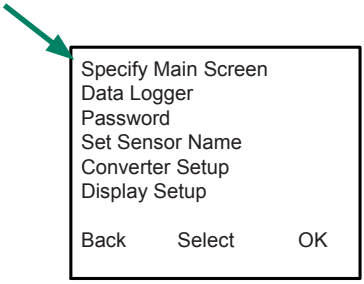
## Main Menu

1. Press the "Setup" key on the ***SuSix®*** display (see below) to enter the ***SuSix®*** Main Menu.



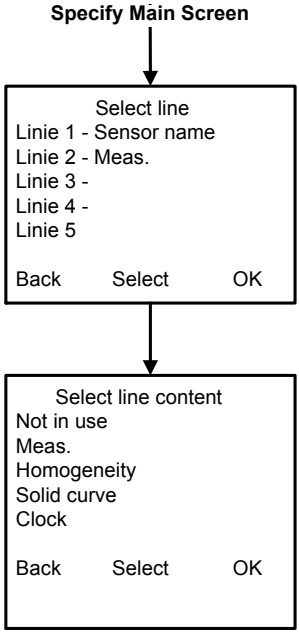

   The ***SuSix®*** Main Menu contains a number of sub menus (see figure below).

2. Press the up/down keys to highlight the required menu line (here: Specify main screen) and then press OK to select it.



## Specify Main Screen

The "Specify Main Screen" menu allows you to customize the ***SuSix®*** display to suit your requirements. You can add and remove five available display lines and name/configure them individually.




1. Press the up/down keys to highlight the required menu line and then press OK to select it.
2. Press the up/down keys to highlight the required option and press OK.

The available options are:

**Not in use**

The line not used. The freed space will be used by the other lines.

**Meas.**

Meas. (Measurement) displays the measured values in time in the pre-defined unit (NTU, FTU, FNU or EBC for turbidity and mg/l, g/l, kg/l or % for suspended solids).

Note: The units are defined later on in the "Converter setup/Units" menu on page 60.

**Homogeneity**

Displays the homogeneity of the measurement. The value informs about the composition of the liquid, not the quality of the measurement.
0% indicates full homogeneity.
100% indicates full non-homogeneity.

**Solid curve**

A liniarization curve can be selected depending on the application. It only applies in suspended solids mode.

**Clock**

Time and date

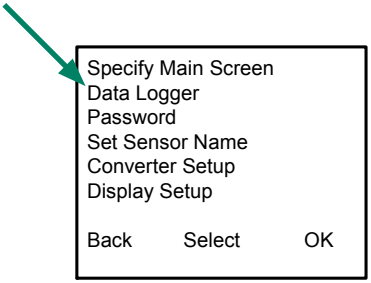
The size of the display lines will automatically increase or decrease as the number of display lines is removed or added to maximize the field of view for the measured values

## Data Logger

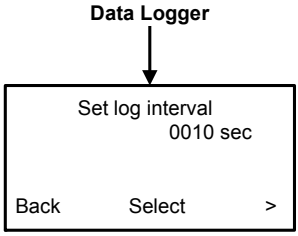
***SuSix®*** provides a data logger with a capacity of approx. 20,000 entry points. See Appendix D on page 107 for examples and descriptions of log files.

The data logger operates after the FIFO principle (First In, First Out). If the data logger is full and new data are coming in, the oldest data are discarded.

1. Press the up/down keys to highlight the required menu line (here: Data Logger) and then press OK to select it.




2. Press the up/down keys to change the highlighted digit, and then press the right-key (>) to proceed to the next digit.




3. Continue until all digits have been set and press OK.
   The log interval can be set in intervals from 10 seconds up to 9999 seconds.

The data log contains:

- Date
- Time
- Flow values

In case of a power failure, the data logger continues when power returns.

If more converters are connected to one Display Unit, each converter has its own individual log interval and can be sorted.

All converters share the same memory of 20.000 entry points.

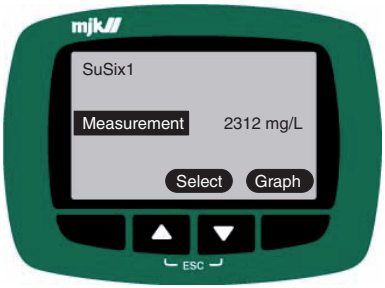
The log data can be shown on the Display Unit or be stored in an external CSV file. MJK-Field Link software is needed for transfer of data into CSV file format via the USB port in the display unit. The format can be read in for example Microsoft® Excel® (see Appendix D on page 107 for details).

An example of the log capacity of one sensor versus the time interval is shown in the following table.

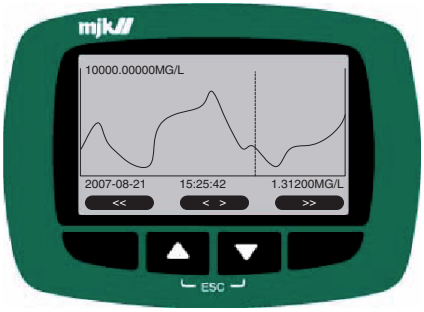
| Log interval | | Log capacity | |
|---|---|---|---|
| Seconds | Minutes | Hours | Days |
| 10 | - | 55,56 | 2,31 |
| 30 | - | 166,67 | 6,94 |
| - | 1 | 333 | 14 |
| - | 5 | 1667 | 69 |
| - | 10 | 3333 | 139 |
| - | 30 | 10000 | 417 |
| - | 60 | 20000 | 833 |

## Graph Display

The content of the Data Logger can displayed on the Display Unit by pressing the up/down keys, highlighting "Measurements" and selecting "Graph"




The Display Unit then shows the Graph screen. To return to the Main Menu display screen, select "esc" by pressing the up/down keys simultaneously.




The Y axis is automatically scaled according to the maximum value of the mA output.

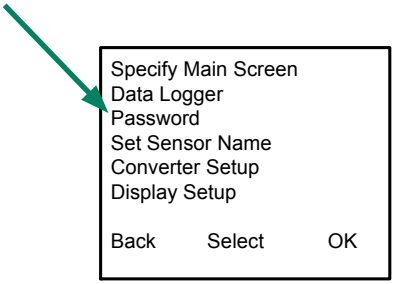
Double-arrow keys jump forward and backward one screen frame at a time. Single-arrow keys move the cursor forward and backward on the screen.

The actual values at the cursor position is shown at the bottom of the screen.

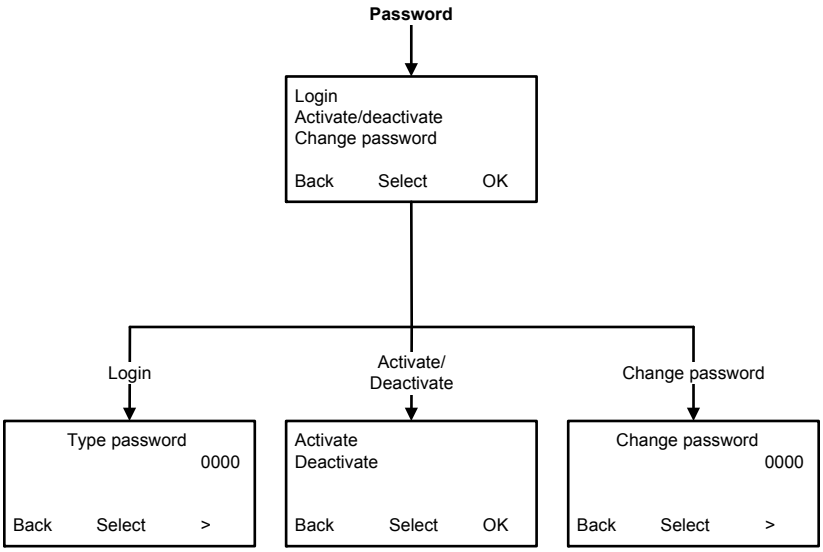
## Password

A password provides (and prevents) access to all the settings in the Display and Converter unit. The code consists of a numeric 5-digit code between 0 and 65535. If your current password is lost or forgotten, the password protection can be overruled with the code "01750".

1. Press the up/down keys to highlight the required menu line (here: Password) and then press OK to select it.




2. Press the up/down keys to highlight the required option and then press OK to select it.



The available options are:

**Login**

Use the up/down keys to set the digits one by one. Continue with > until all digits have been set and then press OK.

**Activate/deactivate**

Write protection. Selecting "Activate" means that a password must be entered to change vital settings. "Deactivate" disables password protection. If your current password is lost or forgotten, the password protection can be overruled with the code "01750".

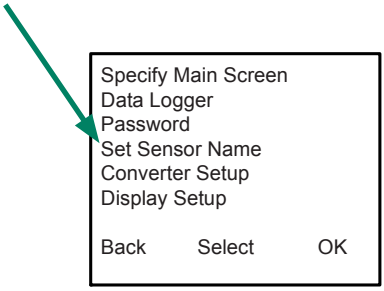
**Change password**

The present 5-digit password can be changed as required.

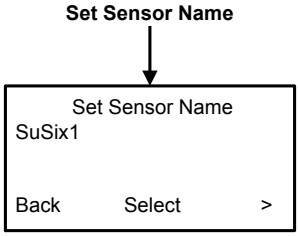
## Set Sensor Name

A unique name and/or number, a function or a location can be assigned for a sensor (here: "SuSix1"). It is consequently shown on the main display with up to 4 display lines.

1. Press the up/down keys to highlight the required menu line (here: Set Sensor Name) and then press OK to select it.




2. To change the default sensor name (SuSix1), press the left/right keys to highlight the wanted character.



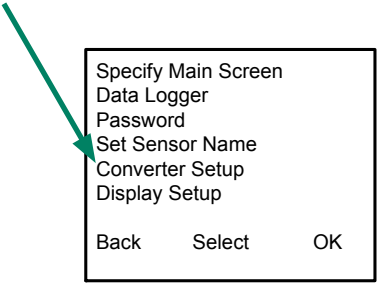

3. Press the up/down keys to change the highlighted character and then press > to proceed to the next character.
4. Continue with > until all numeric and alphabetical characters have been set to.
5. Press OK.

The available characters depend on the chosen language. English, for example, provides the following character set:
a b c d e f g h i j k l m n o p q r s t u v w x y z A B C D E F G H I J K L M N O P Q R S T U V W X Y Z <space> 1 2 3 4 5 6 7 8 9 and 0.

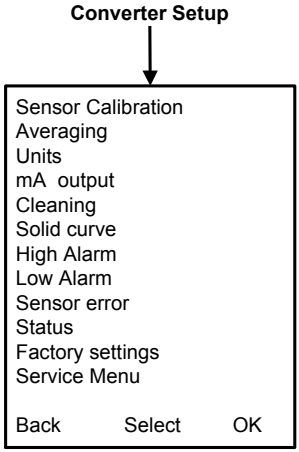
## Converter Setup

"Converter Setup" provides configuration options for calibration, alarms, units, etc. See detailed descriptions in the following sections, and a continuous fold-out overview on page Gf-2 at the end of this manual.

1. Press the up/down keys to highlight the required menu line (here: Converter Setup) and then press OK to select it.



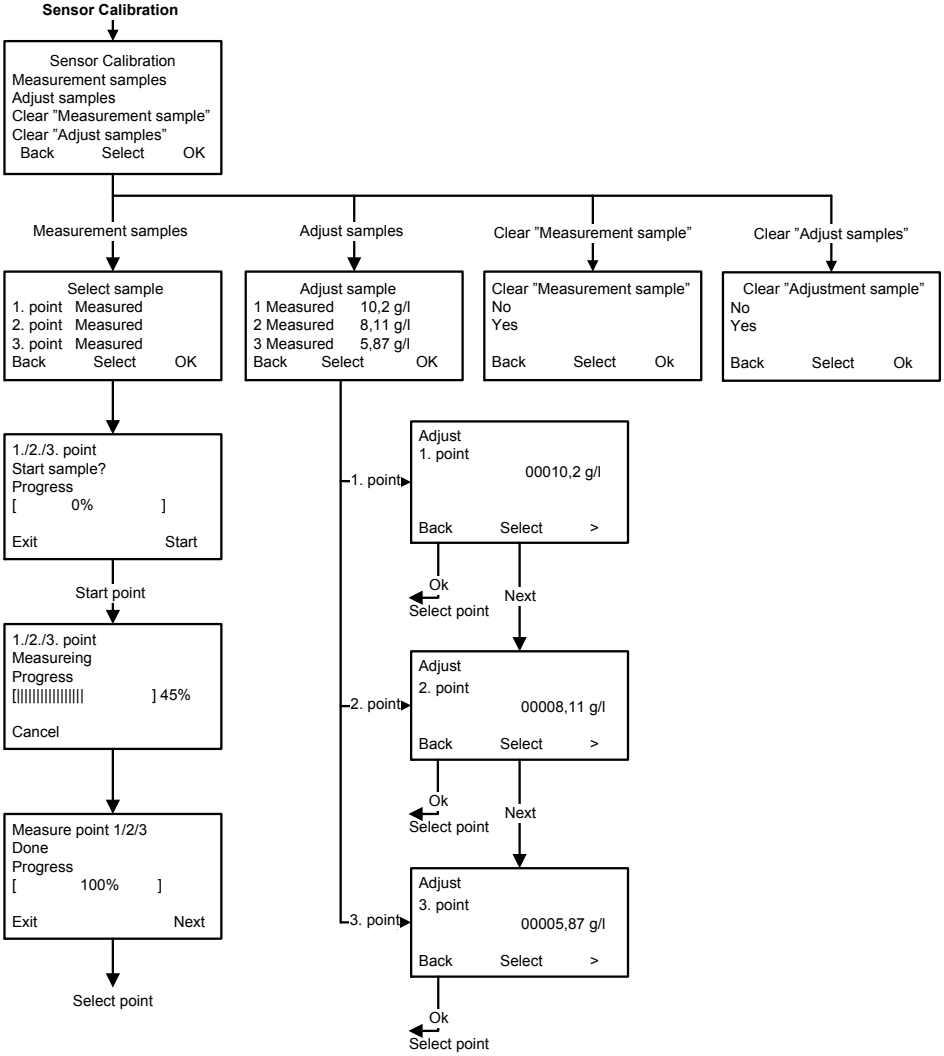

2. Press the up/down keys to highlight the required option and then press OK to select it.




The available options are described in detail in the following sections.

## Sensor Calibration

The "Sensor Calibration" option sets the signal outlets, and the analogue outputs and the limit values are «frozen» during the calibration process.




See page 23 for detailed calibration procedures.

### Turbidity calibration

A complete, normalized linearization curve of the probe is installed by the manufacturer. No further calibration is possible (or required).

### Suspended solids calibration

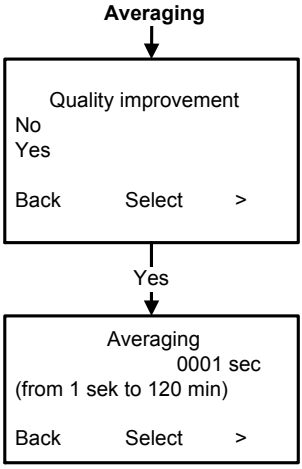
There are no calibration standards pre-defined for the system. Each measurement must be calibrated individually, and it is possible to define two suspended solids curves for use in different liquids.

Suspended solids calibration requires a sample to be evaluated in a laboratory in order to set the relation between the measured point and the actual value of the sample.

## Averaging

The "Averaging" option sets the time period within which the measurements are smoothed and averaged.

The current measured value is compared with the standard deviation of the previous measured values. This feature ensures that a sudden deviation in the liquid composition is eliminated in the measurement

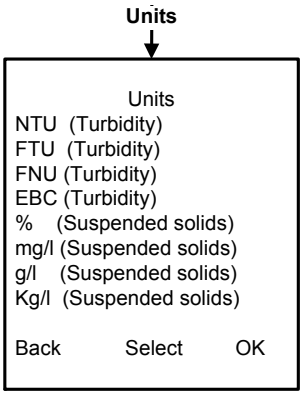



1. Select "Yes" in the "Quality improvement" window.

2. Select the digits one by one with the left/right keys and set the value with the up/down keys.
3. Press OK to save the final setting.

## Units

The "Units" option sets the unit for turbidity and suspended solids. The available units are shown below.



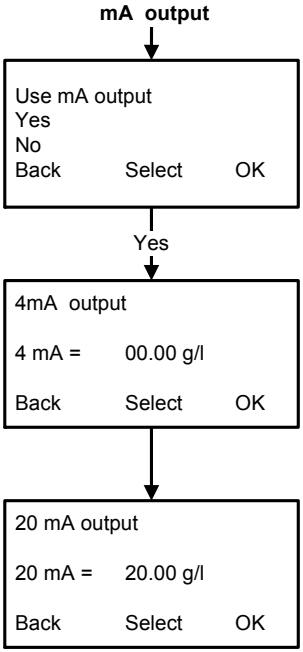

1. Press the up/down keys to highlight the required unit and then press OK to select it.

## mA Output

When a ***SuSix®*** is connected to a power supply for the first time, the mA output is automatically set to provide 4 mA at zero and 20 mA at the theoretical maximum value.

Changes in the mA setting will not affect the relay output settings.

Note: Both values can be set in the range 10 % to 120 %, making it possible to increase or decrease the mA signal.



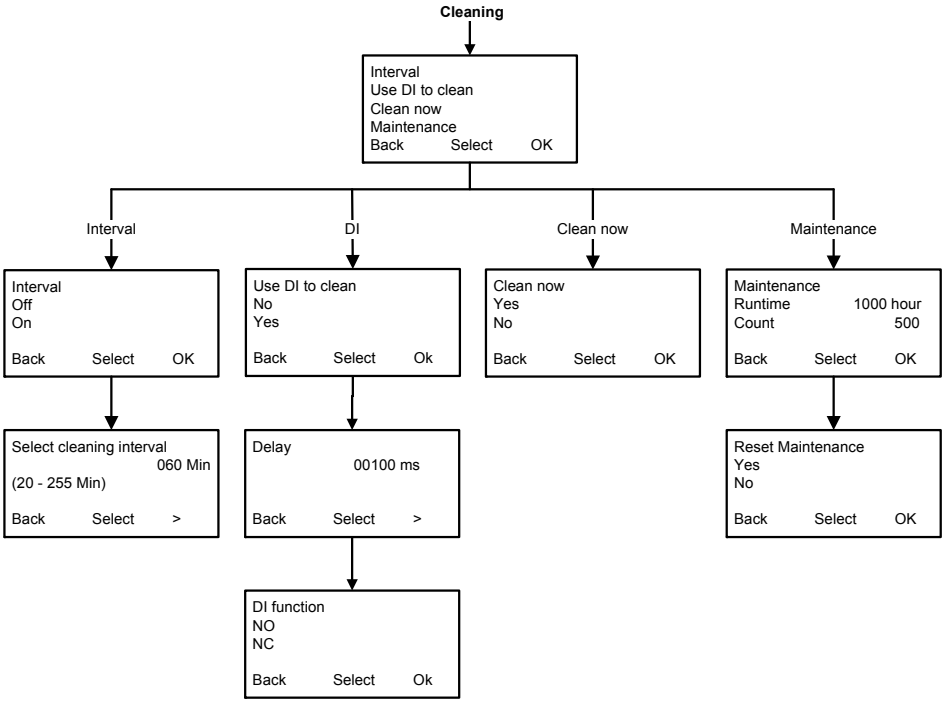

The mA output is an active output, and the maximum load is 800 Ohm.

The upper limit for the mA output is 20,5 mA

3,75 mA indicates the mA output is not in use
3,5 mA indicates values under 4 mA level
20,5 mA indicates value higher than 20 mA level.

## Cleaning

If the sensor is the wiper type, the "Cleaning" menu is automatically available, and you may set the cleaning intervals as required.



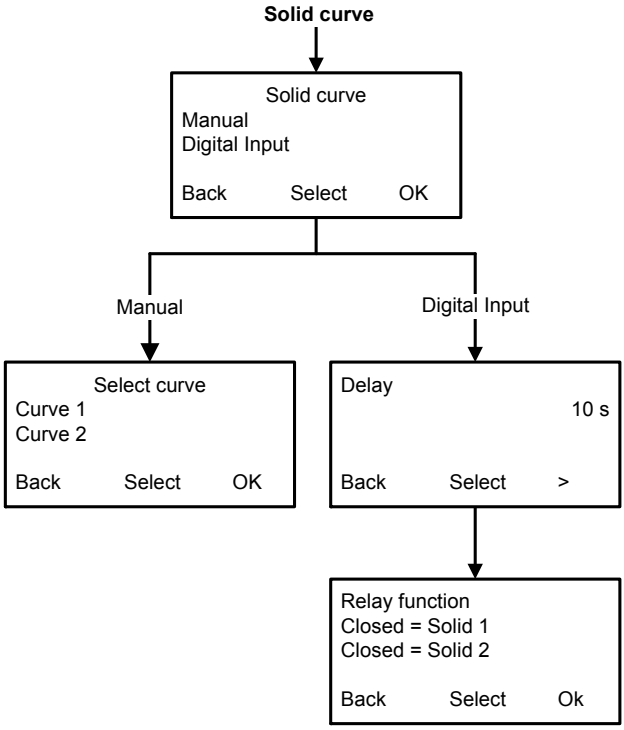

Cleaning may be determined by a fixed time interval, by a digital input signal (DI), by manual interaction (Clean now), or by a number of runtime hours.

## Solid curve

It is possible to define two calibration curves for measuring suspended solids in different liquids.

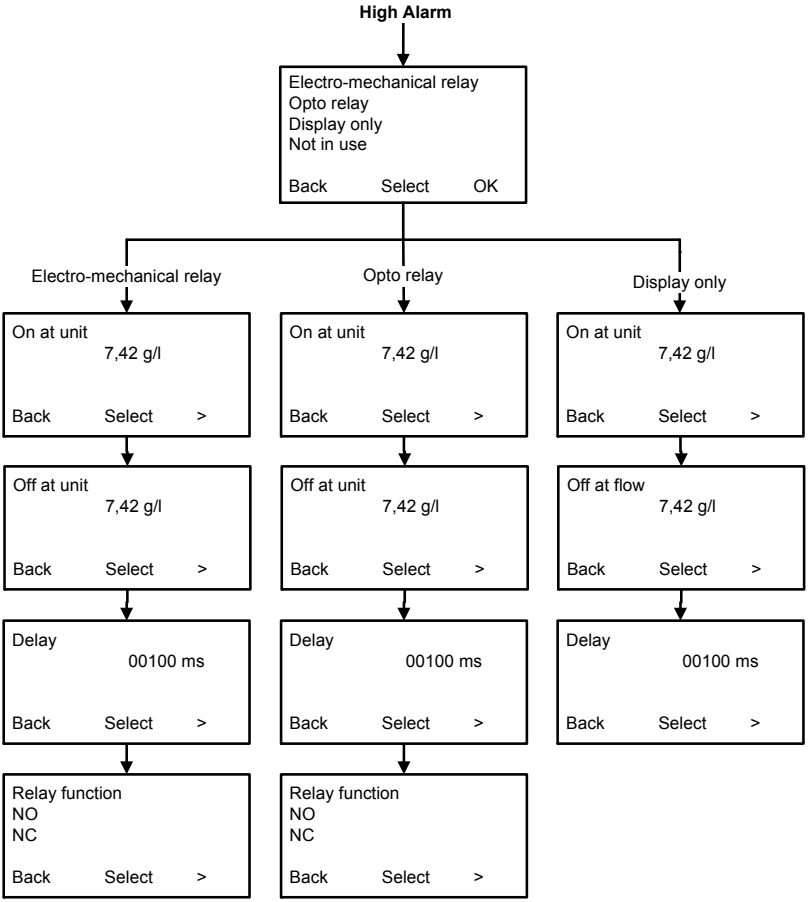
The calibration (liniarization) curves each requires a sample to be evaluated in a laboratory in order to set the relation between the measured point and the actual value of the sample.

The selection can be manual via the main display or automatic via the digital input (DI).



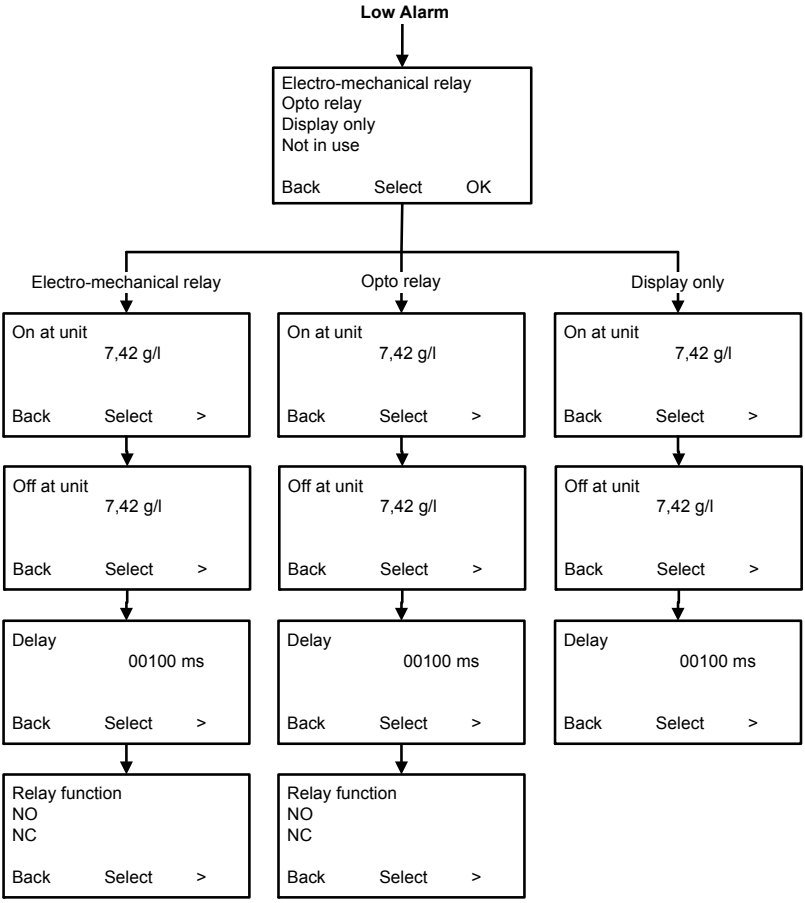
## High alarm

A set point can be set to trigger an alarm (here: a high alarm) and to activate one of two relays or simply to display the alarm on the display.



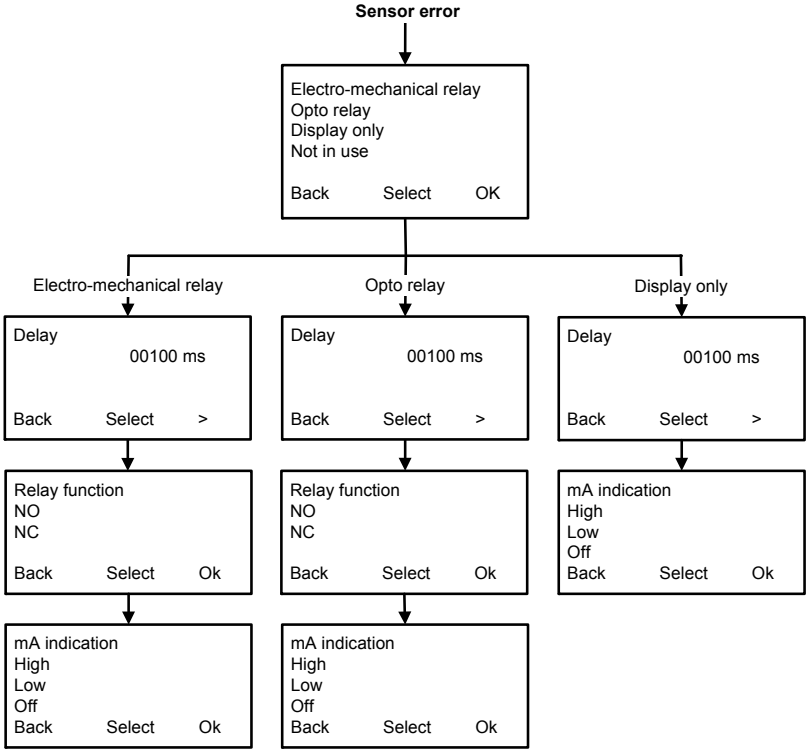
## Low alarm

A set point can be set to trigger an alarm (here: a low alarm) and to activate one of two relays or simply to display the alarm on the display.



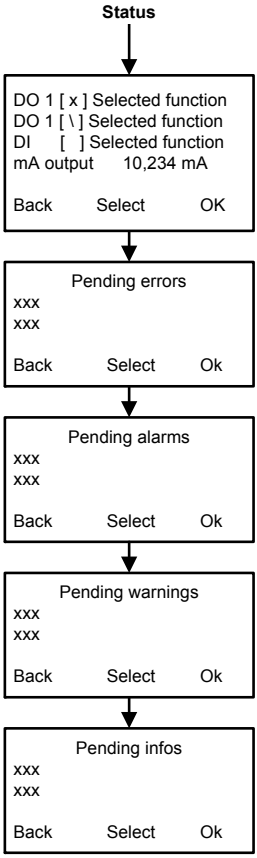
## Sensor error

SuSix® has two digital outputs - DO1 with an opto (light triggered) relay and DO2 with an electro-mechanical relay. They can both be programmed for a sensor error, whenever the 4 - 20 mA range has been exceeded.



## Status

The "Status" option provides an overview of the in- and output status.




The check boxes can contain four different characters:

- **X** A cross (X) in a check box indicates an active state
- **/** A blinking forward slant (/) in a check box indicates that the input/output is in the process of being activated. Eventually it turns into a steady X.
- **** A blinking backward slant (\) in a check box indicates that the input/output is in the process of being de-activated. Eventually the check box is cleared.

An empty check box indicates a de-activated state.

**DO 1 [ X ] Selected function**

The selected function linked to digital output D01 is active (an "X" in the check box).

**DO 2 [ X ] Selected function**

The selected function linked to digital output D02 is in the process of being de-activated (an "X" in the check box).Digital output D02 for Totalizer Forward is activated (a ticked check box).

**DI [ ] Selected function**

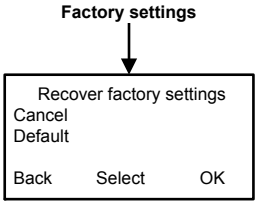
The selected function linked to digital input DI de-activated (an empty check box). A "selected function" could for example be "Wiper".

**mA output 10.234 mA**

The present analog output current is 10.234 mA.Pending errors, alarms, warnings and info are displayed for the selected in- or output.

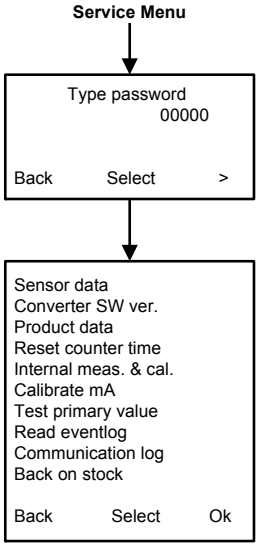
## Factory settings

The "Factory settings" menu provides resetting to the original factory settings (except the language setting).



## Service Menu - Digest

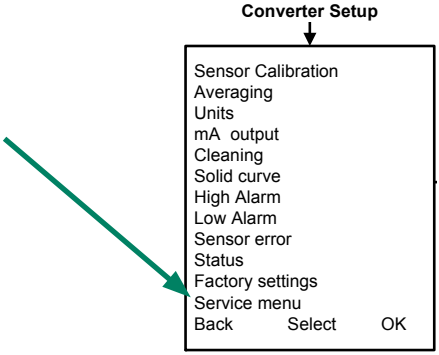
The "Service Menu" provides options intended for service personnel during installation, calibration, operation, monitoring and maintenance.



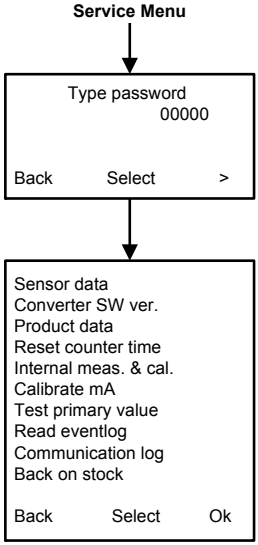

All parameters can be read without any restrictions, but certain parameters can only by changed after a password has been typed.

## Service Menu - Detailed

The "Service Menu", a submenu in "Converter setup", is intended for MJK and other authorized service personnel during installation, calibration, commissioning, operation, monitoring and maintenance.

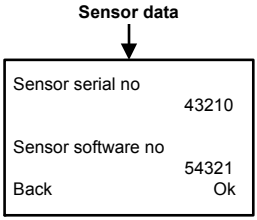



All parameters can be read without any restrictions, but certain parameters can only by changed after a password has been typed.



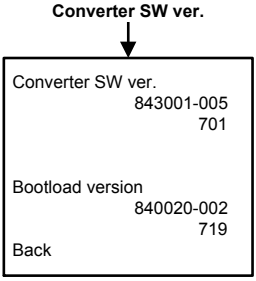
## Sensor data

"Sensor data" displays the factory-assigned sensor serial number and the present sensor software version.



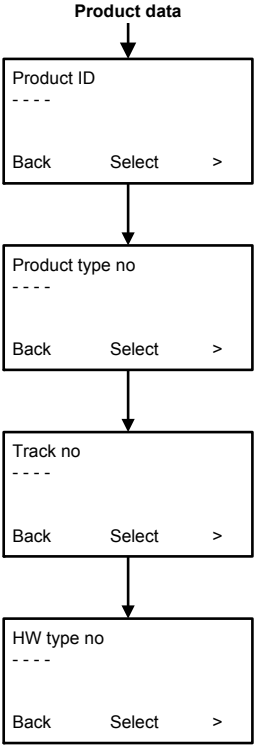

## Converter SW ver.

The converter software version and the bootload version are displayed. From that you can determine whether a software (firmware) upgrade is required or not.



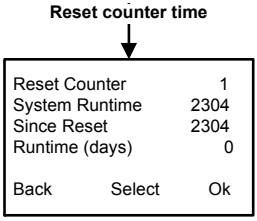
## Product Data

Key product data like ID, hardware type no., track no. and HW type no. are displayed.



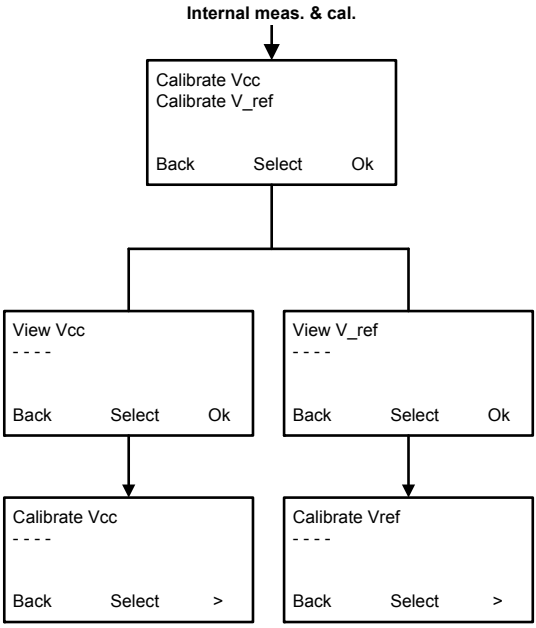

## Reset Counter Time

The counter can be reset for fault finding, error correction and similar service procedures, and the actual runtime is displayed.



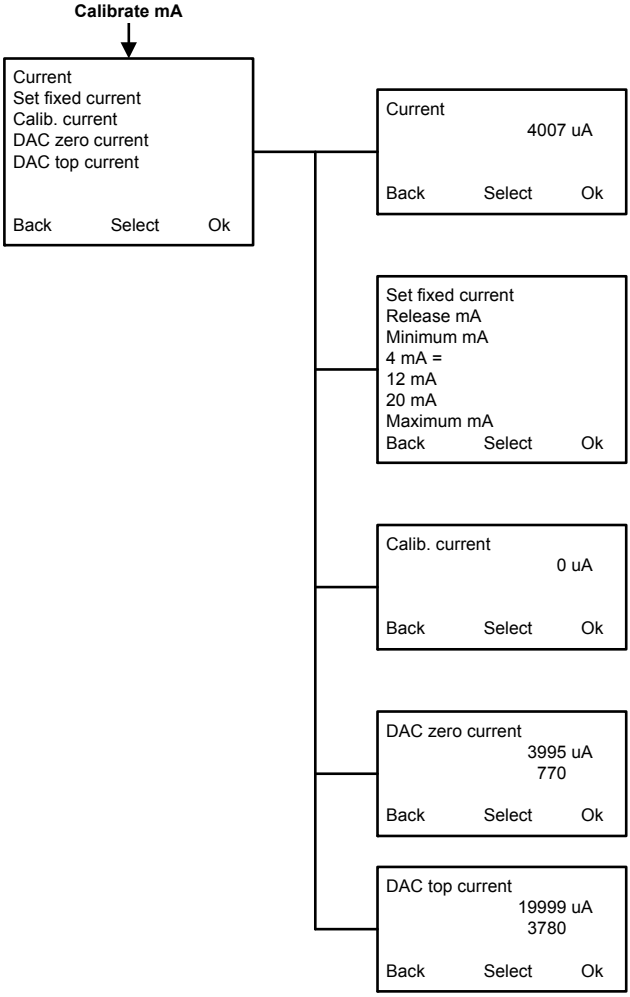
## Internal Meas. & Cal.

Internal measurements and calibrations are for service personnel use only! The supply voltage (Vcc) and the reference voltage (Vref) can be viewed and adjusted.



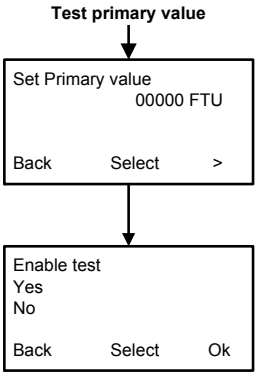
## Calibrate mA

From this menu the mA reading can be calibrated against a multimeter.



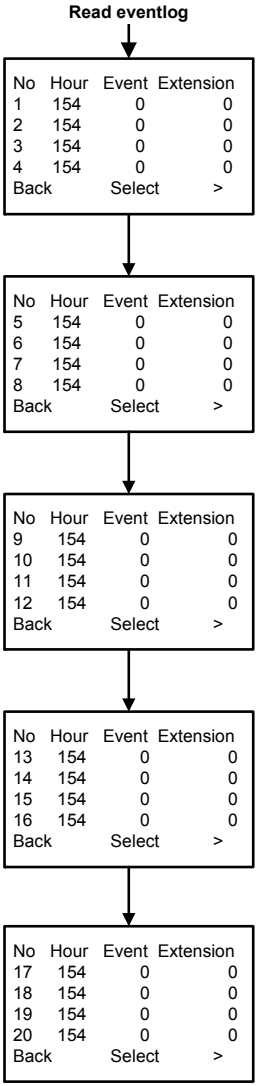
## Test primary value

"Test primary value" is for MJK service personnel use only. It can be set to for example 600 FTU to test a state or condition for a given input value.



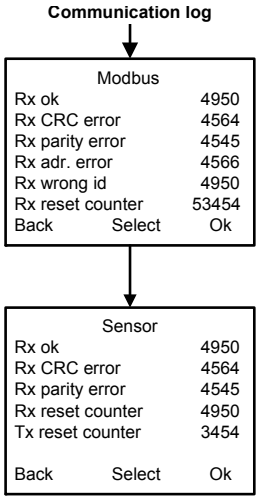
## Read Eventlog

View the events within a certain time frame.



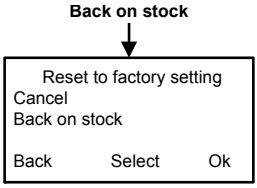
## Communication log

View the Modbus and sensor communication logs. Primarily intended for fault detection.




## Back on stock

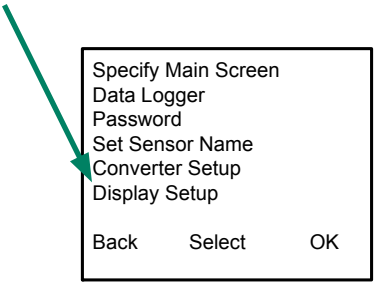
The factory settings can be re-etablished with the "Back on stock" option.



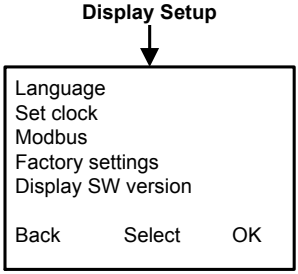
## Display Setup

The "Display Setup" menu provides options for language, clock and factory settings, Modbus parameters and software version display.

1. Press the up/down keys to highlight the required menu line (here: Display setup) and then press OK to select it.




2. Press the up/down keys to highlight the required optione and then press OK.




The available options are described in detail on the following pages.

## Language

The SuSix® is installed with a language package, and (GB) English is the default language.

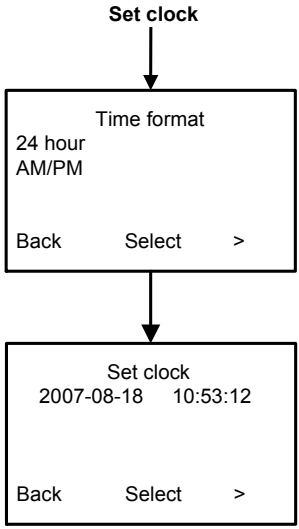
In the "Language" menu several national languages can be selected.

Additional languages can be added using the MJK-Field Link software program (see also page 104).

1. Chose the required language using the up/down keys up and then press OK.

## Set clock

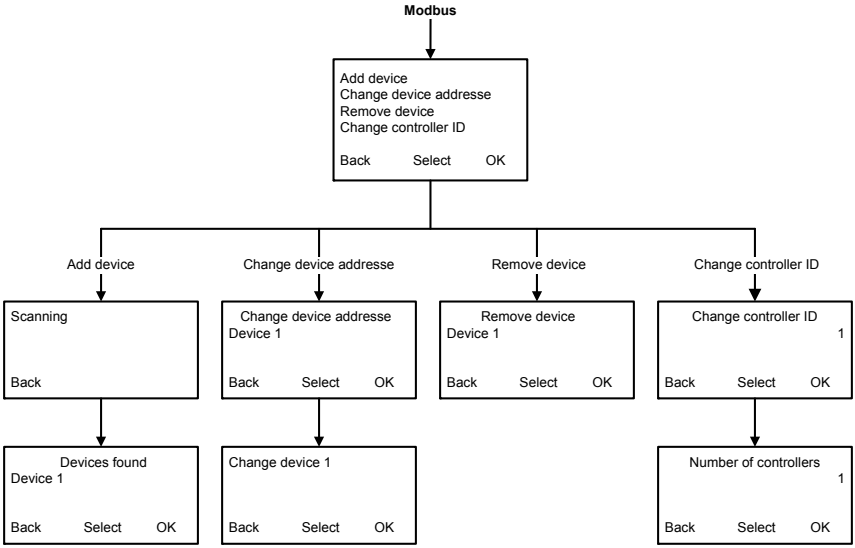
The "Set clock" menu provides setting of the built-in clock and the time format.




1. Select the date and time digits with the left/right keys and change the setting with the up/down keys.
2. Press OK and repeat step 1 for all remaining digits.
3. Press OK to save the time/clock settings.

## Modbus

The SuSix® is delivered with a standard Modbus RTU protocol, and up to four SuSix® and/or MagFlux® converters can be connected for concurrent operation.




When several converters are to be added, it is necessary to change each converter device address to a unique ID address before connecting the converter to the Display Unit.

### Add device

Four SuSix® Converters can be connected to one Display Unit using the RS485 interface connection. Note that only one Display Unit can be used with several converters.

The Display Unit can easily be moved to another converters for readout and configuration.

1. Select "Add Device", click OK and wait for the scan process to finish.
2. The found converters are finally displayed.

### Change device address

To change each converter's device adress it is required that you connect the Display Unit to each converter one by one to change each converter's device address. If neglected, a conflict between the units will arise when the RS 485 serial loop is established.

Change for example "Device 1" to "Device 2" as follows:

1. Press OK and use the up/down keys to change "1" to "2".
2. Press OK.

The SuSix® converter ID is now changed to "2", and more converters can be added to the Display Unit with the "Add Device" option.

### Remove Device

If a device is to be removed from the Display Unit, proceed as follows:

1. Select the required device with the up/down keys.
2. Click OK to remove it.

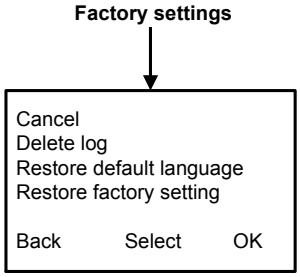
The device is now removed from the Display unit and display returns to the "Modbus" menu.

### Change controller ID (display)

The display controller ID must be changed when several displays operate with the same converter(s)

## Factory settings

The "Factory settings" menu provides log deletion and resetting to factory settings of the display unit.



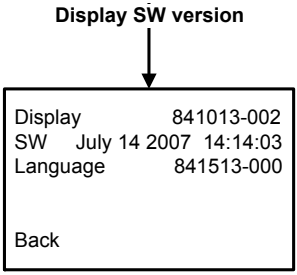

1. Press the up/down keys to highlight the required option and press OK.

**Important:**

The data logger will be reset, and all devices will be deleted from the display Unit. This is indicated by the MJK start-up screen which is displayed within a few seconds.

## Display SW version

The "Display SW version" menu provides a read-out of the display software (actually firmware) version, the build date and last-edited date of the the multiple languages file.



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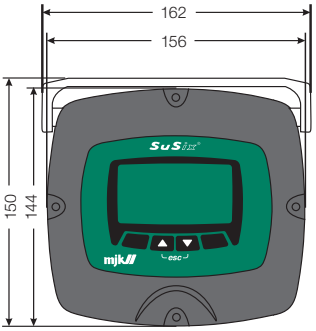
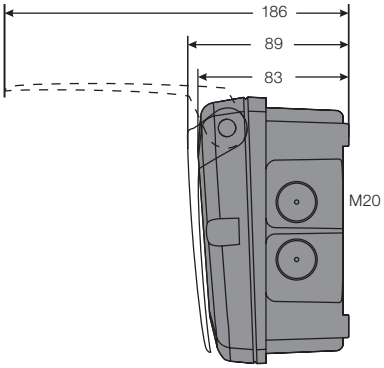
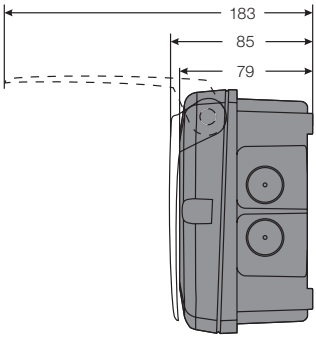
# 9. Mechanical Dimensions

## Sensor

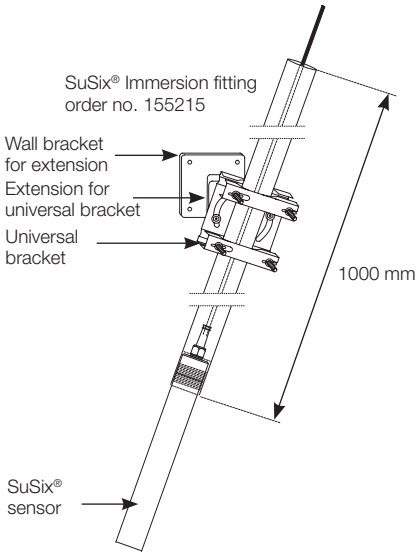
## Converter and Display Unit



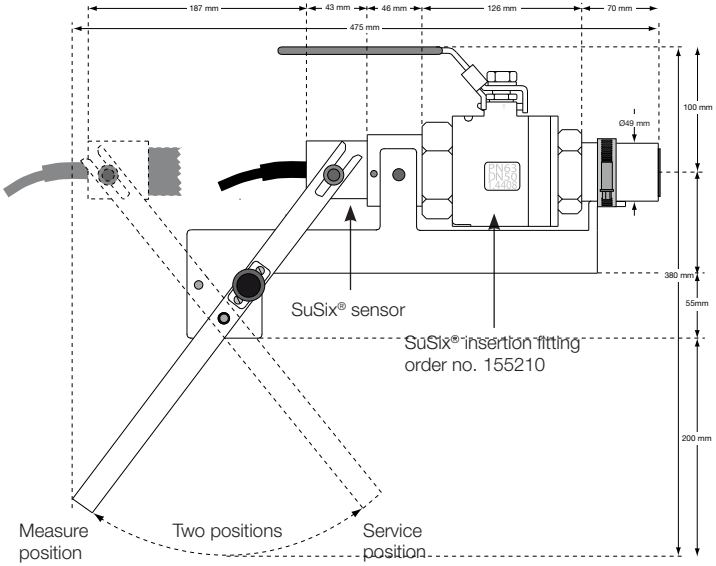



## Immersion Fitting




## Insertion Fitting



## Spareparts for Insertion Fitting

| Spareparts for Insertion Fitting | |
|---|---|
| **Order number** | **Sparepart** |
| 251712 | Teflon gasket 6,2 x 10 mm |
| 551073 | Pipe clip |
| 570092 | O-ring, polyethane, 40 x 50 x 10 mm |
| 599029 | Loctite 577, 50 ml |

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# 10. Maintenance

The SuSix® sensor should be cleaned on a regular basis to maintain its accuracy.

Initially the the transmitter should be cleaned once a week or every two weeks until the optimal cleaning interval can be determined.

## Cleaning the Sensor - Once a Month

1. Remove the transmitter from the liquid.
2. Clean the sensor with a soft, moist cloth and clean water. A mild detergent or dishwashing liquid may be used.
3. Dry the sensor with a soft cloth.
4. Immerse the transmitter into the liquid to be measured.

*Note: The accuracy will deteriorate, if the measuring optics are scratched by for example a steel brush during cleaning.*

5. The cleaning intervals may need to be shortened all depending on the usage and the location.

## Cleaning the Transmitter

When seen necessary the SuSix® transmitter may be cleaned with a soft, moist cloth.

## Functional Tests - Once a Year

### Electronics

1. Check the suspended solids transmitter calibration.
2. Tighten the terminal screws and ensure that all leads are connected correctly.
3. A service contract maintains the equipment reliability and accuracy. Get in contact with MJK's national sales and service representatives.

# Replacing Wipers and Gaskets - Every Two Years

## Maintenance interval

SuSix® sensors with wipers call for replacement of the wiper drive shaft gasket every 2 years.

## Requirements

Maintenance must be carried out by MJK authorized personnel only in an electrostatic discharge secured area (ESD).

## Required materials

Required materials

- Wiper Kit, order number 206350 includes:
  - Wiper
  - Screwdriver
  - Screw and gasket
  - User instructions
- Soft cloth

## Install the new gasket and wiper

1. Move the sensor from the process fluid.
2. Disconnect the sensor from the converter and all electrical connections.
3. Clean and wipe the sensor off thoroughly.
4. Position the probe in a stable, upright position.
5. Unscrew by hand the wiper with shaft counter-clockwise (see figure 1).
   **DO NOT** loosen or remove the screw!

①

②

6. Turn by hand the replacement wiper with shaft and O-rings (figure 2) clockwise (figure 3).
7. Tighten with a torque of 15 Ncm.

③

8. It is very important that the wiper is secured in its resting position indicated by the white area (see figure 4). Otherwise the wiper will block the optics and the sensor will not measure correctly.
9. If the wiper is not secured within the white area, loosen the screw and reposition the wiper correctly and tighten the screw again.
10. Reconnect the sensor to the converter and put the sensor back into operation.

④

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# Appendix A. Pop-up and Error Messages

| Alarms | |
|---|---|
| Current overrange | **Alarm** - The mA connection has exceeded the 4 - 20 mA range. For example 3,5 or 20,5 mA. |
| Factory reset occurred | **Alarm** - A factory reset has occured. Some settings have changed. Check all used settings. |
| High alarm | **Alarm** - The high set point has been detected. |
| Low alarm | **Alarm** - The low set point has been detected. |
| mA connection | **Alarm** - The mA connection is not connected. If the current-out is used, deactivate mA Current out to stop this alarm. |
| **Errors** | |
| Calibration | **Error** - 1. Perform calibration (see page 99) and/or check the units and ranges (see page 60). |
| Eeprom write error | **Error** - Eeprom write error. If error keeps popping up, contact MJK. |
| Measuring start failed | **Error** - Start failed. Try again. |
| Measuring timeout | **Error** - Timeout. Try again. |
| Missing adjustment | **Error** - The measured value has not been entered. |
| Not in solid mode! | **Error** - Calibration can only be performed when in solid mode. Change mode and try again. |

| | |
|---|---|
| Sensor | **Error** - General sensor error that may also be transferred to a relay output.<br>Contact MJK. |
| Sensor communication | **Error** - Check the cable condition and tighten the connectors. |
| Sensor hardware | **Error** - Change the sensor hardware. |
| Sensor setting | **Error** - Some settings are wrong or have been changed. |
| Sensor supply | **Error** - The sensor supply is too low or too high. Check the sensor cable connection. |
| Sensor wiper | **Error** - Make sure that the wiper is free to move and not obstructed by dirt deposits. |
| System | **Error** - Internal VCC error. See the event log for details. |
| System error | **Error** - The system software is inoperable including faulty alarm and sensor bits.<br>Contact MJK. |
| Turbidity offset | **Error** - A zero-point probe problem. The sensor needs a zero calibration.<br>Contact MJK. |
| **Warnings** | |
| Needs higher meas.sample | **Warning** - Calibrate at a higher concentration. |
| Needs lower meas.sample | **Warning** - Calibrate at a lower concentration. |
| Sensor range exceeded | **Warning** - The measured value is out of range. Check the measuring range and the measuring units. |

| Info | |
|---|---|
| Measurement hold | **Info** - The measurement is set on hold during the cleaning cycle or by an error. |
| Sensor needs cleaning | **Info** - The sensor needs cleaning real bad. |
| System reset occurred | **Info** - The converter has been subject to a software or hardware reset. |
| Turbidity > 4000 NTU | **Info** - The measured value has exceeded 4000 NTUs. Clean the probe. |
| **USB** | |
| Flash programming please wait | Programming is in progress but not finished. |
| Flash programming done | Programming is finished. |
| Flash crc error | Cyclic redundancy check error. |
| Unknown command flash user text | Unvalid command issued. |
| Flash address overrun | A write error hos occured. |
| File phase error | Internal USB error. |
| File write failure | A write error hos occured. |
| USB protocol overrun | A communication error has occured. |

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# Appendix B. MJK-Field Link Software

The MJK-Field Link software package provides several utilities that will be described in detail on the following pages:

- PC <-> SuSix® transmitter interconnection
- Saving log data
- Display firmware upgrade
- Converter firmware upgrade
- Language installation

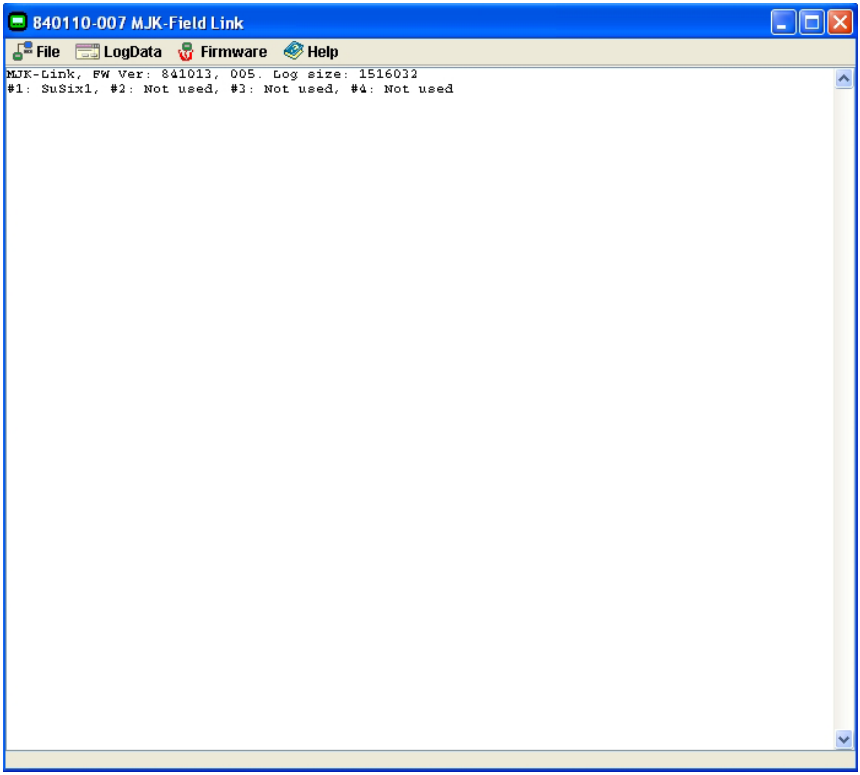
### Important Notes!

1. Current SuSix® log data must be saved in a file before transferring and installing new firmware. See "2. Save Log Data" overleaf.
2. Note down all display and converter settings before upgrading new firmware.
3. The upgrade procedures below must be carried out in strict alphabetical order. First procedure A, then B, C, D and finally E.

## A. Connect a PC to the SuSix®

1. Insert the SuSix® MJK-Field Link CD-ROM into the PC's disk drive. The MJK-Field Link opening menu will appear after a short while (see below). If the auto-run function does not execute, locate the "MJK-Field-Link 840110-007.exe" file (or a similar file) and click "Run".

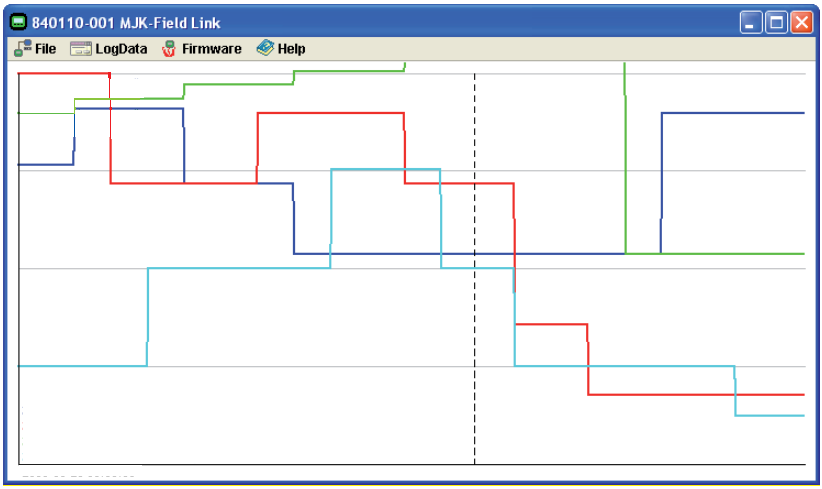
2. Unscrew the four screws that hold the Display Unit.
3. Lift out the Display Unit and connect a USB mini A/B cable to the mini USB female B connector on the rear of the front panel.
4. Connect the other end of the USB cable (max. 4.7 metres long) to the PC.
5. Select "File" in the menu bar and click "Mount USB".
   If the connection is successful, a "Device Clock" window for PC and device time synchronisation is displayed (if PC and device clock were out of sync.) along with a link status display (see below).




If the connection fails, first remove the cable and then re-connect it.

## B. Save Log Data

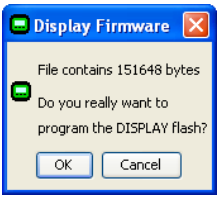
1. Select "LogData" in the menu bar and click "Save Log to File".
2. Assign a file name, find the destination you want to save the file to, and click "Save". Consequently the file is saved, and the contents is displayed.




## C. Upgrade Display Firmware

***Important: Always upgrade the display firmware before you upgrade the converter software.***

1. Select "Firmware" in the menu bar and click "Display".
2. Locate the "MJK Field FW" directory on the CD-ROM, select the 841xxx-xxx.hex file (or similar 841*.hex) and click "Open".
3. Click OK when the "Display Firmware" dialogue box appears and prompts for programming the display Flash memory.




The display unit firmware is then transferred, and the display unit is consequently programmed. Expect this process to take a few minutes.

4. A "Searching for MJK-Field" dialogue box then appears and prompts for disconnecting and re-connecting the USB cable.

   Do as suggested and click OK.

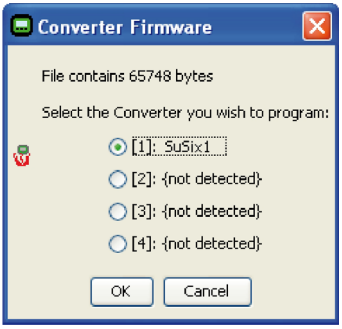
5. Meanwhile the ***SuSix***® Display Unit restarts and displays the MJK logo, the new link status is displayed, and the Display Unit informs that the PC is once again connected.
   Click OK on the PC and the ***SuSix***® Display Unit to return to the ***SuSix***®.

6. Adjust the ***SuSix***® Display Unit screen contrast by pressing the two outmost keys simultaneously (indicated by the keys) and press the up/down keys as required.

7. Save the new setting by again pressing the two outmost keys simultaneously.

## D. Upgrade Converter Firmware

1. Select "Firmware" in the menu bar and click "Converter".
2. Locate the "MJK Field FW" directory on the CD-ROM, select the "842xxx-xxx.hex" file (or similar) and click "Open".
3. Select the required ***SuSix***® (option 1, 2, 3 or 4) and click OK when the "Converter Firmware" dialogue box appears and prompts for selecting the converter to program.

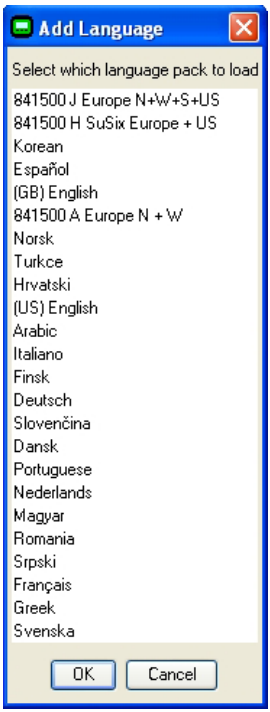



   The converter firmware is then transferred, and the converter Flash programming is initiated. Expect this process to take a few minutes.
4. When the Flash programming is done, click OK on the PC and the ***SuSix***® Display Unit to return to the ***SuSix***® display.
5. If required you may adjust the ***SuSix***® Display Unit screen contrast by pressing the two outmost keys simultaneously, press the up/down keys as required, and save the new setting by again pressing the two outmost keys simultaneously.

## E. Install/Add Languages

All languages are removed during a display firmware upgrade. Consequently the required languages must be re-installed at this stage.

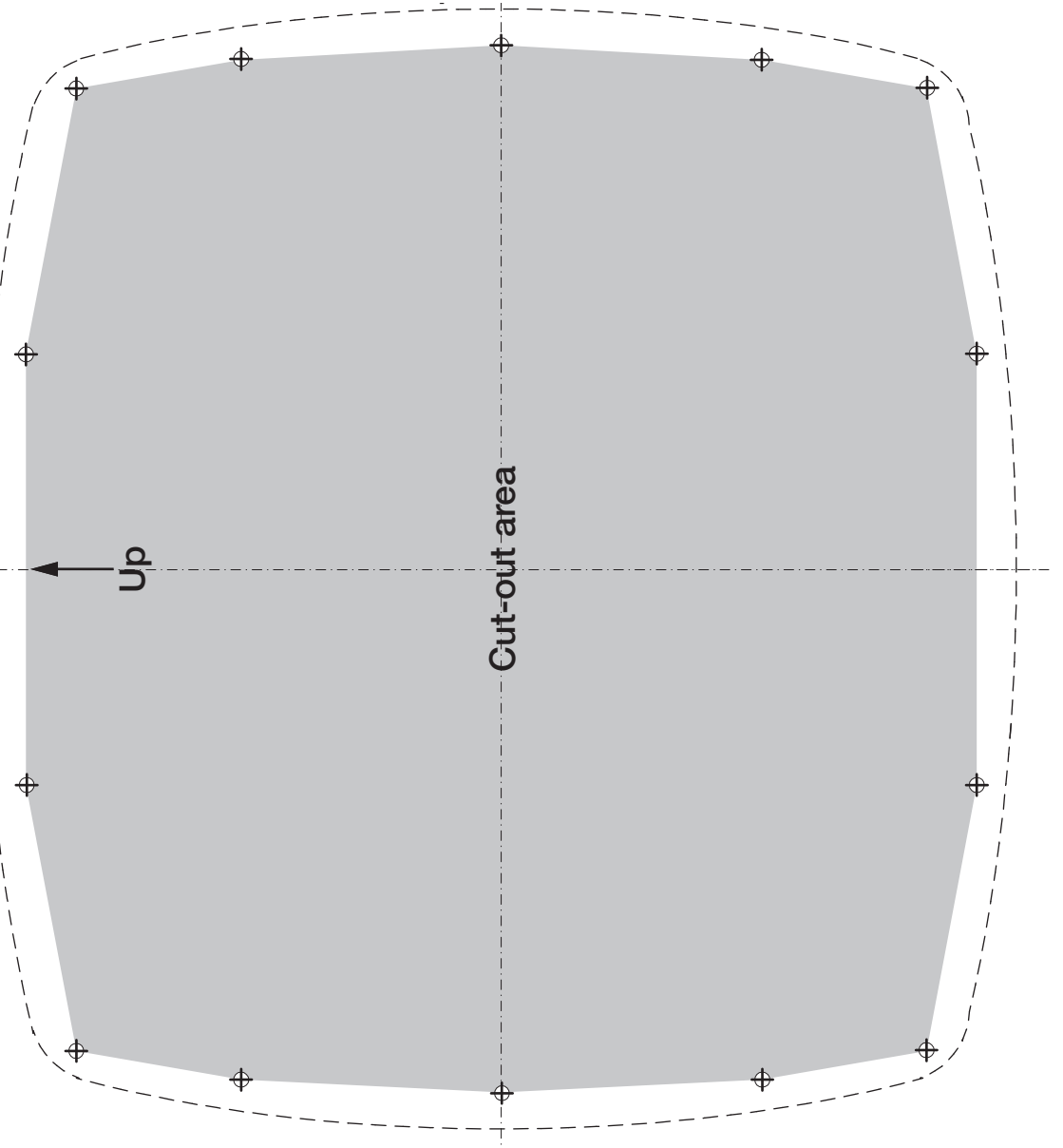
1. Select "File" in the menu bar and click "Languages".
2. A dialogue appears showing the currently installed languages (none following a firmware upgrade).
   You can now either add or delete the required languages.
3. Click "Add", select the required language text file (or language pack) in the "MJK Field Display Unit text files" directory on the CD-ROM (for example 841513-008.txt) and click "Open".
4. Select for example "841500 J Europe N+W+S+US" in the "Add Language" dialogue box (N+W+S+US = North, West, South and USA) and click OK.



5. The languages are then transferred and loaded.
   If required, you can remove one or more languages by selecting them from the list, clicking "Delete" and "Close".

# Appendix C. Front Panel Cut-out Drawing

The dotted line indicates the front panel outline and measures 155 x 145 mm.



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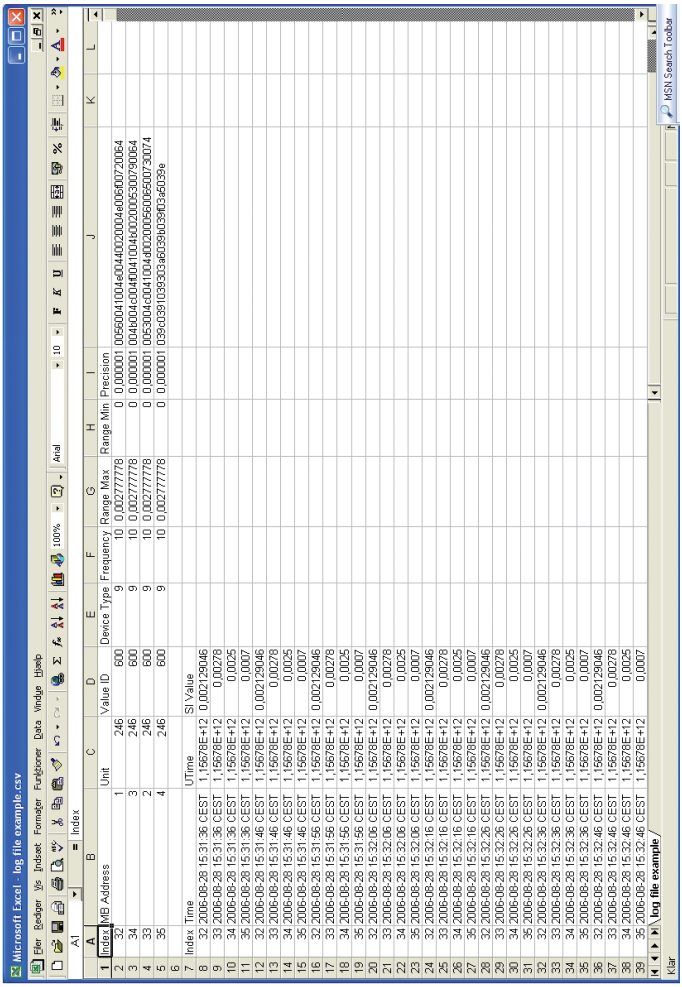
# Appendix D. Log Files

The example log file shown below is the result of a CSV file from the converter (see "Save Log Data" procedure on page 101) having been opened in with Microsoft® Excel® spread sheet utility.

The example below illustrates a SuSix® converter being logged every 10 seconds.



| Index | MB Address | Time | UTime | Unit | Value ID | Device Type | Frequency | Range Max | Range Min | Precision | SI Value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 32 | 2006-08-28 15:31:36 CEST | 1,15678E+12 | 1 | 246 | 600 | 10 | 0,002777778 | 0 | 0,000001 | 0,00219046 |
| 2 | 34 | 2006-08-28 15:31:36 CEST | 1,15678E+12 | 3 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,00278 |
| 3 | 33 | 2006-08-28 15:31:36 CEST | 1,15678E+12 | 2 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0025 |
| 4 | 35 | 2006-08-28 15:31:36 CEST | 1,15678E+12 | 4 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0007 |
| 5 | 32 | 2006-08-28 15:31:46 CEST | 1,15678E+12 | 1 | 246 | 600 | 10 | 0,002777778 | 0 | 0,000001 | 0,00219046 |
| 6 | 34 | 2006-08-28 15:31:46 CEST | 1,15678E+12 | 3 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,00278 |
| 7 | 33 | 2006-08-28 15:31:46 CEST | 1,15678E+12 | 2 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0025 |
| 8 | 35 | 2006-08-28 15:31:46 CEST | 1,15678E+12 | 4 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0007 |
| 9 | 32 | 2006-08-28 15:31:56 CEST | 1,15678E+12 | 1 | 246 | 600 | 10 | 0,002777778 | 0 | 0,000001 | 0,00219046 |
| 10 | 34 | 2006-08-28 15:31:56 CEST | 1,15678E+12 | 3 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,00278 |
| 11 | 33 | 2006-08-28 15:31:56 CEST | 1,15678E+12 | 2 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0025 |
| 12 | 35 | 2006-08-28 15:31:56 CEST | 1,15678E+12 | 4 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0007 |
| 13 | 32 | 2006-08-28 15:32:06 CEST | 1,15678E+12 | 1 | 246 | 600 | 10 | 0,002777778 | 0 | 0,000001 | 0,00219046 |
| 14 | 34 | 2006-08-28 15:32:06 CEST | 1,15678E+12 | 3 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,00278 |
| 15 | 33 | 2006-08-28 15:32:06 CEST | 1,15678E+12 | 2 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0025 |
| 16 | 35 | 2006-08-28 15:32:06 CEST | 1,15678E+12 | 4 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0007 |
| 17 | 32 | 2006-08-28 15:32:16 CEST | 1,15678E+12 | 1 | 246 | 600 | 10 | 0,002777778 | 0 | 0,000001 | 0,00219046 |
| 18 | 34 | 2006-08-28 15:32:16 CEST | 1,15678E+12 | 3 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,00278 |
| 19 | 33 | 2006-08-28 15:32:16 CEST | 1,15678E+12 | 2 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0025 |
| 20 | 35 | 2006-08-28 15:32:16 CEST | 1,15678E+12 | 4 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0007 |
| 21 | 32 | 2006-08-28 15:32:26 CEST | 1,15678E+12 | 1 | 246 | 600 | 10 | 0,002777778 | 0 | 0,000001 | 0,00219046 |
| 22 | 34 | 2006-08-28 15:32:26 CEST | 1,15678E+12 | 3 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,00278 |
| 23 | 33 | 2006-08-28 15:32:26 CEST | 1,15678E+12 | 2 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0025 |
| 24 | 35 | 2006-08-28 15:32:26 CEST | 1,15678E+12 | 4 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0007 |
| 25 | 32 | 2006-08-28 15:32:36 CEST | 1,15678E+12 | 1 | 246 | 600 | 10 | 0,002777778 | 0 | 0,000001 | 0,00219046 |
| 26 | 34 | 2006-08-28 15:32:36 CEST | 1,15678E+12 | 3 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,00278 |
| 27 | 33 | 2006-08-28 15:32:36 CEST | 1,15678E+12 | 2 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0025 |
| 28 | 35 | 2006-08-28 15:32:36 CEST | 1,15678E+12 | 4 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0007 |
| 29 | 32 | 2006-08-28 15:32:46 CEST | 1,15678E+12 | 1 | 246 | 600 | 10 | 0,002777778 | 0 | 0,000001 | 0,00219046 |
| 30 | 34 | 2006-08-28 15:32:46 CEST | 1,15678E+12 | 3 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,00278 |
| 31 | 33 | 2006-08-28 15:32:46 CEST | 1,15678E+12 | 2 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0025 |
| 32 | 35 | 2006-08-28 15:32:46 CEST | 1,15678E+12 | 4 | 246 | 600 | 9 | 0,002777778 | 0 | 0,000001 | 0,0007 |

The entries are described on the following page.

**Index** Converter ID (here four converters: 32, 33, 34 and 35)

**MB Address** Modbus address (here: 1, 2, 3 and 4)

**Unit** SI unit according to the MJK unit codes (here: 246=NTU)

| MJK Unit Codes | | |
|---|---|---|
| **Code no.** | **Unit** | |
| 16 | GPM | gallons per minute |
| 17 | l/min | litres per minute |
| 19 | $m^3/h$ | cubic meters per hour |
| 23 | MGD | million gallons per day |
| 24 | l/sec | litres per second |
| 28 | $m^3/sec$ | cubic meters per second |
| 57 | % | percent |
| 95 | mg/l | milligrams per litre |
| 96 | kg/l | kilograms per litre |
| 97 | g/l | grams per litre |
| 130 | $ft^3/h$ | cubic feet per hour |
| 138 | l/h | litres per hour |
| 139 | ppm | parts per million |
| 246 | NTU | Nephelometric Turbidity Units |
| 248 | FNU | Formazin Nephelometric Units |
| 249 | EBC | European Brewing Convention |
| 250 | FTU | Formazine Turbidity Units |

**Value ID** Modbus address for flow (here: 600)

**Device Type** The device type (here: 9 = SuSix®)

**Frequency** Log interval in seconds (here: 10 seconds)

**Range Max** Maximum value for graph

**Range Min** Minimum value for graph

**Precision** The precision of the SI value

**Column J** The sensor name as entered by the operator.

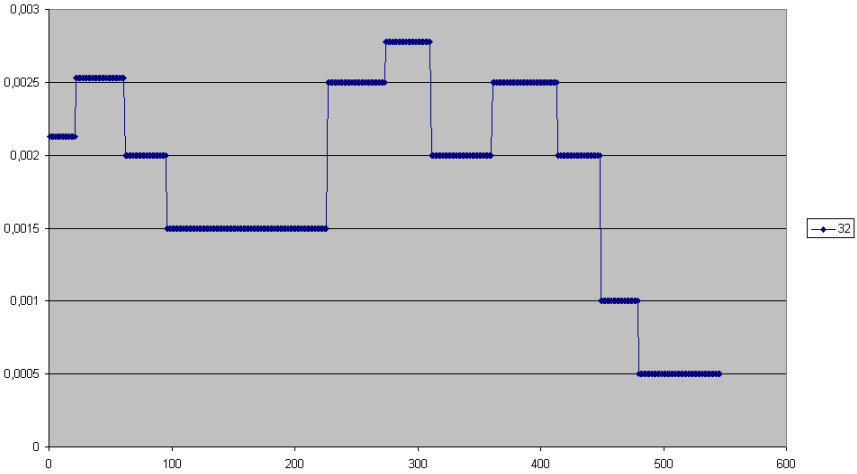
**Time** Date and time in Central European Standard Time (CEST)

**UTime** The time in UNIX format. Number of seconds since January 1, 1970.

**SI Value** The value in SI units (**S**ystème **I**nternational d'Unités)

To plot the log file's data, proceed as follows:

1. Start Excel and open the csv log file.
2. Sort by "Index", click the "Diagram Guide" tool in the toolbar and select the required curve or graph (see example on the next page).



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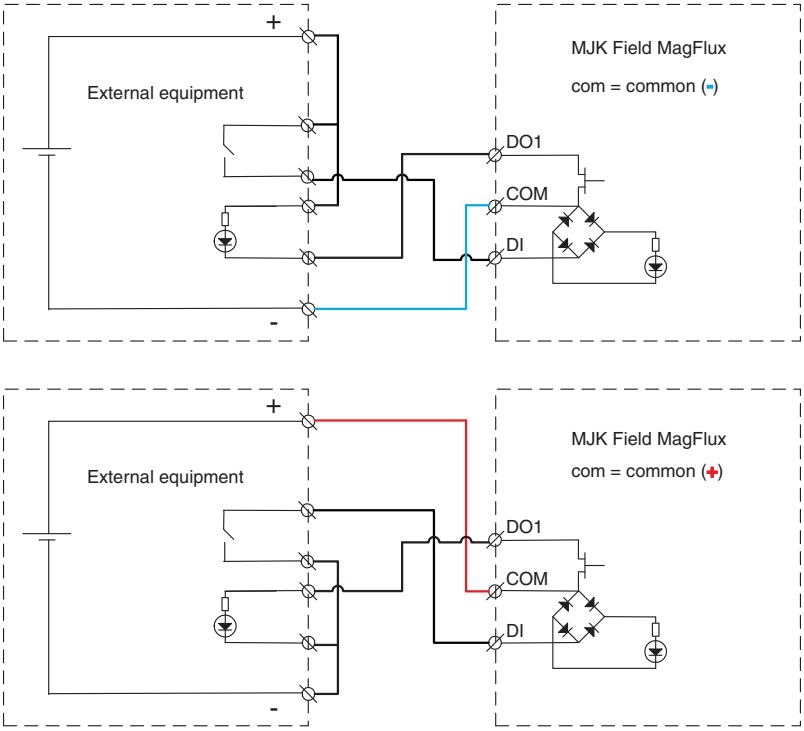
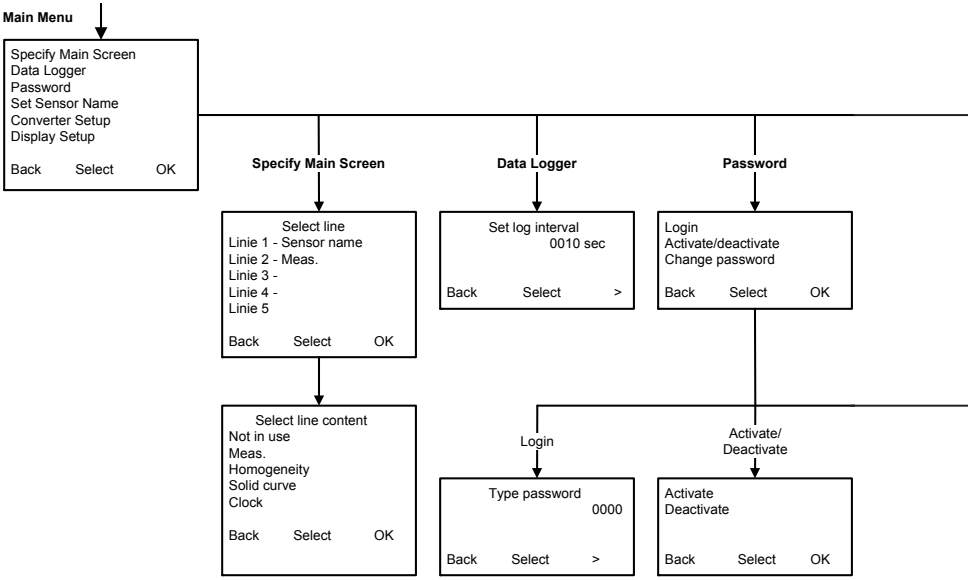
# Appendix E. Digital Input/Output Connections

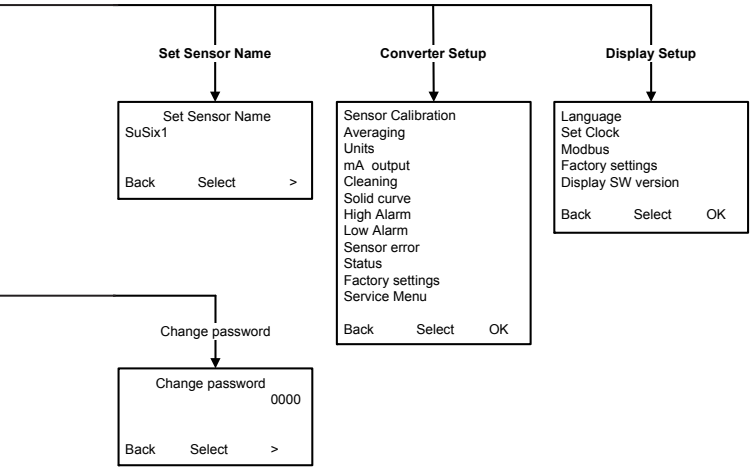
The digital in- and outputs, DI and DO, can be interconnected to external equipment to achieve a number of functions such as alarms, counter reset, flow direction indication, etc.

The two schematics below illustrate a simplified mode of operation.

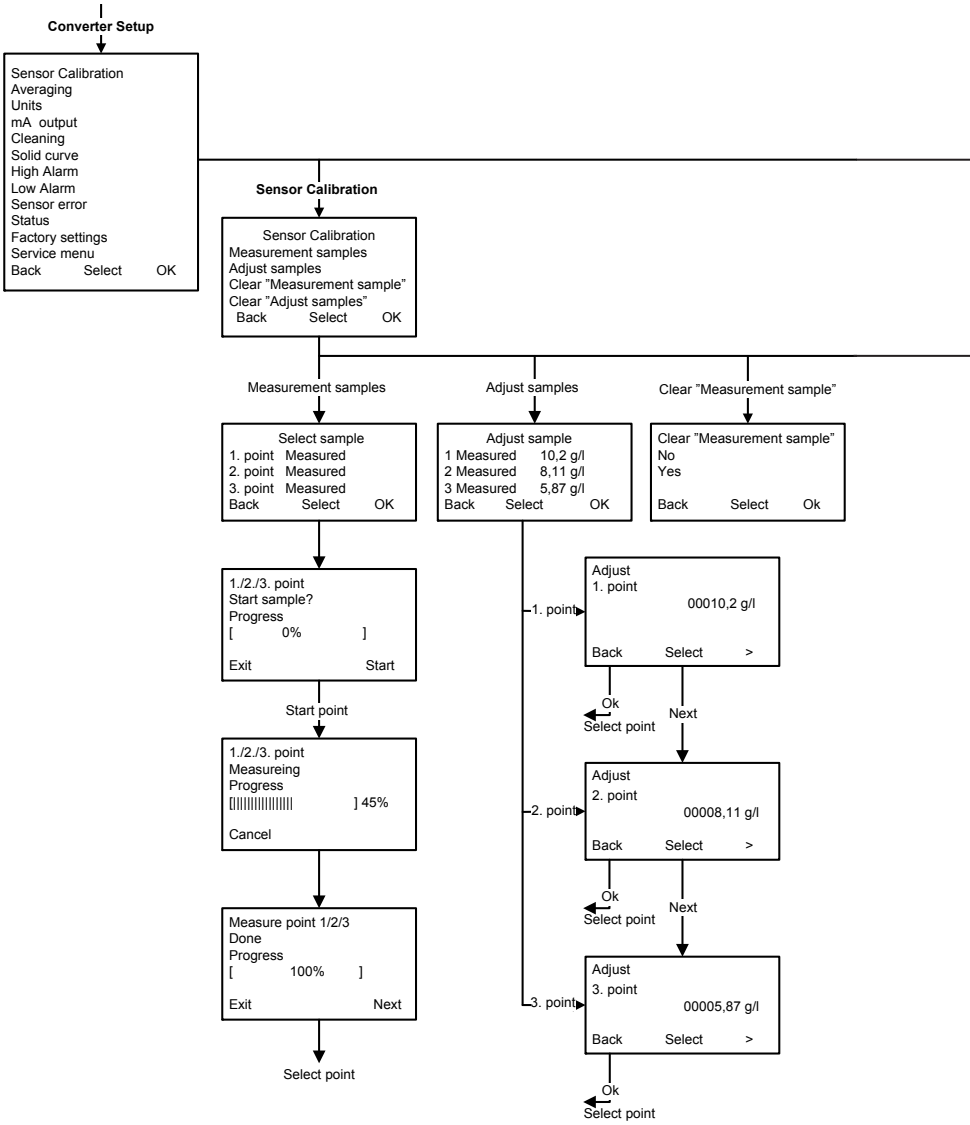


# Main Menu Overview

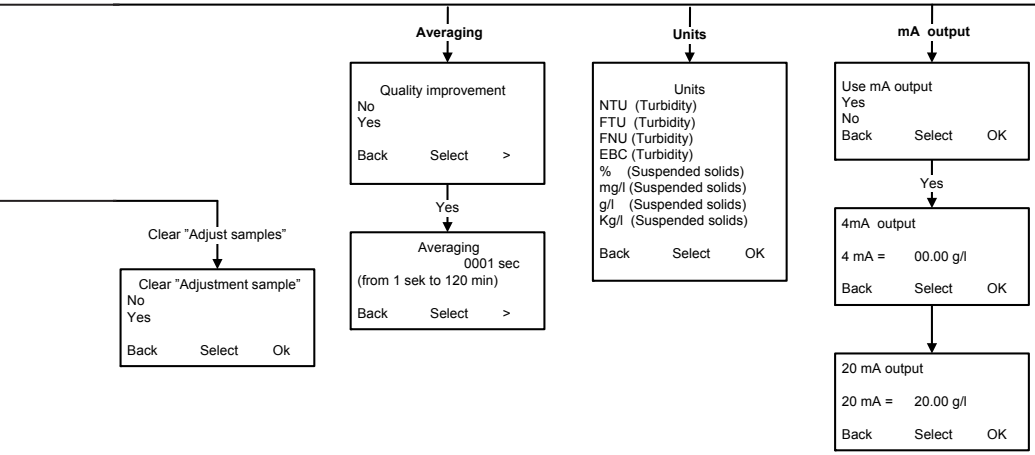



Set Sensor Name
Converter Setup
Display Setup
Set Sensor Name
SuSix1
Back Select >
Sensor Calibration
Averaging
Units
mA output
Cleaning
Solid curve
High Alarm
Low Alarm
Sensor error
Status
Factory settings
Service Menu
Back Select OK
Language
Set Clock
Modbus
Factory settings
Display SW version
Back Select OK
Change password
Change password
0000
Back Select >

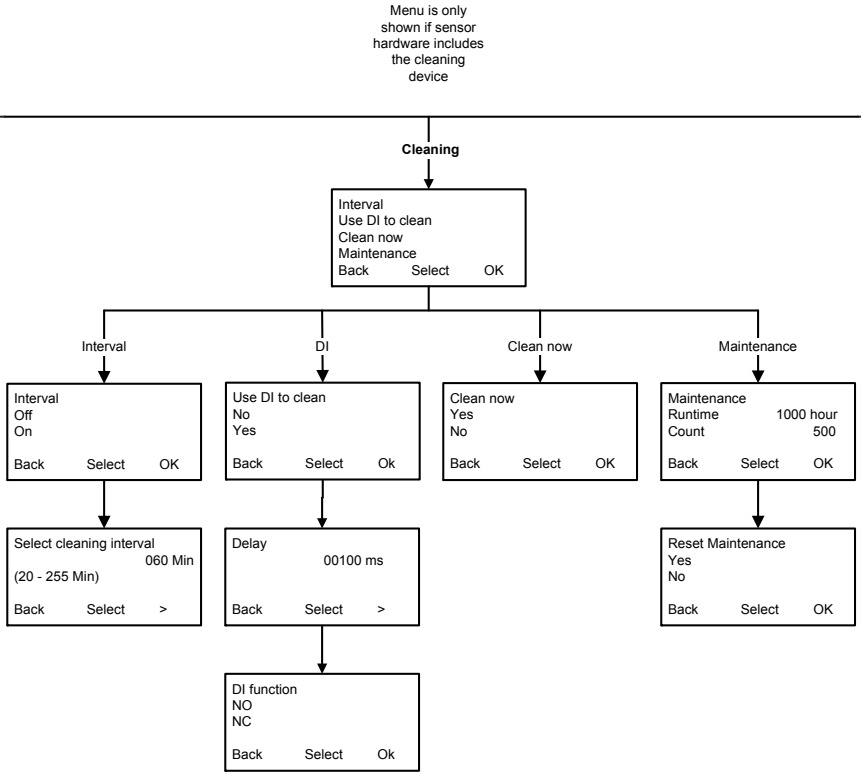
# Converter Setup Menu Overview



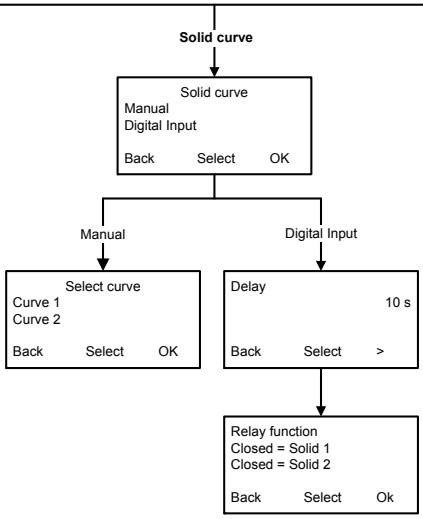
## Converter Setup Menu Overview (continued 2)



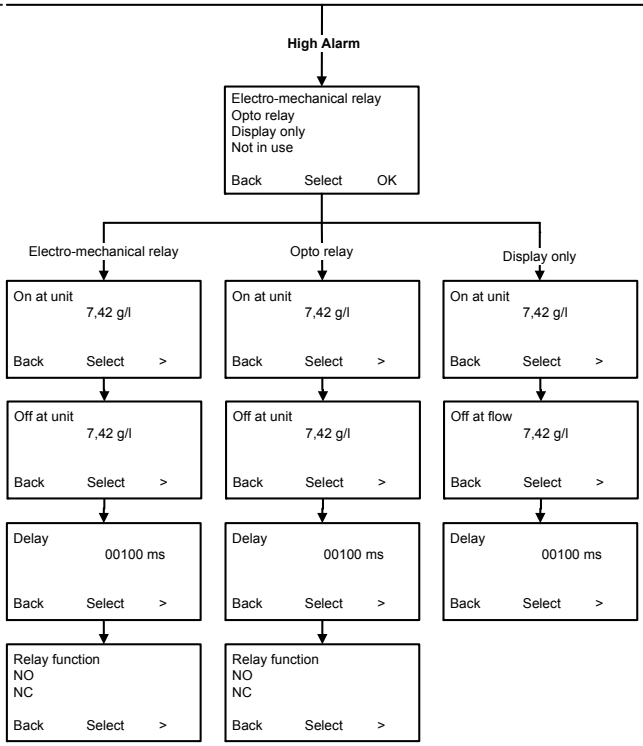
## Converter Setup Menu Overview (continued 3)



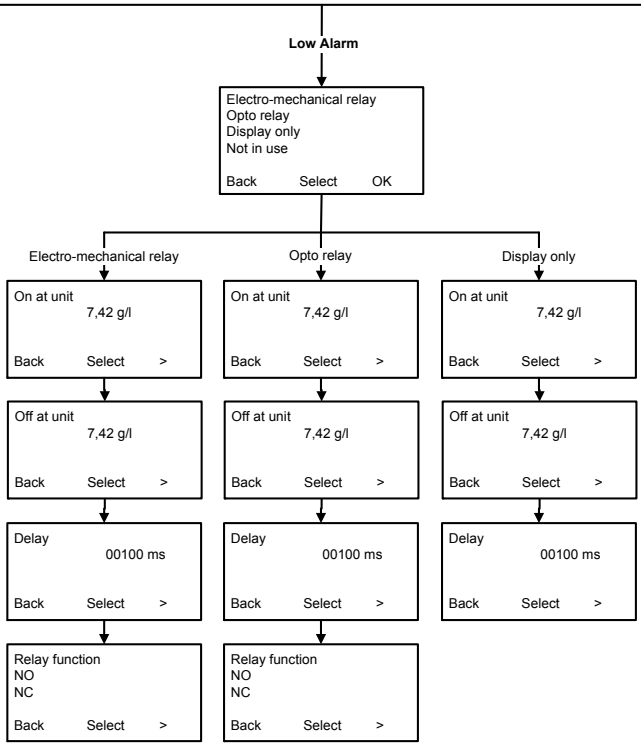
## Converter Setup Menu Overview (continued 4)



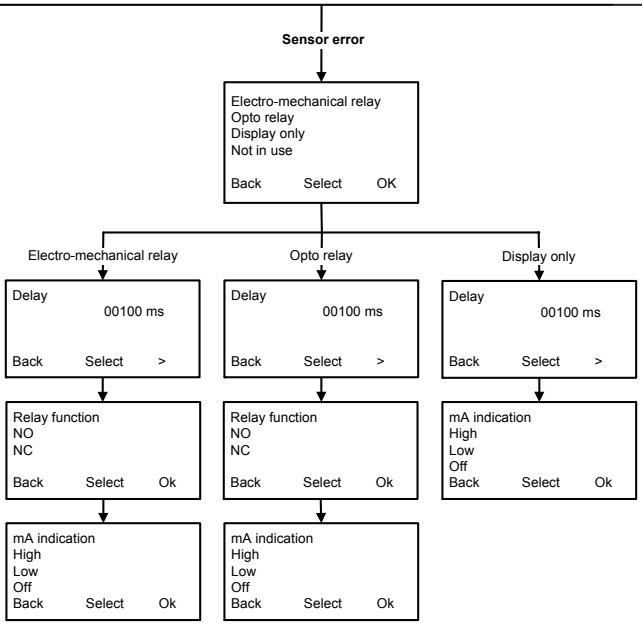
## Converter Setup Menu Overview (continued 5)



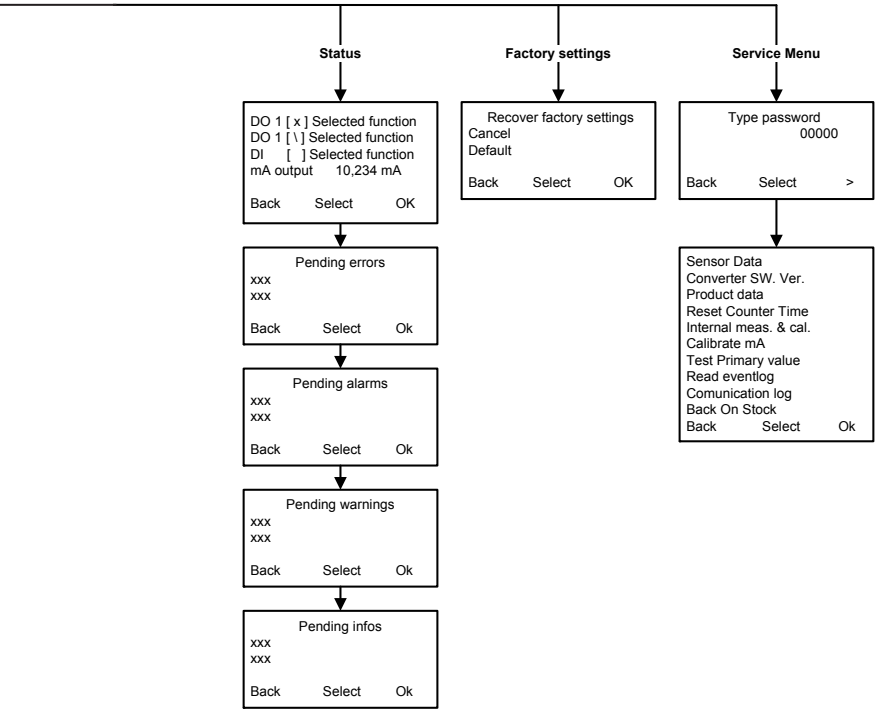
## Converter Setup Menu Overview (continued 6)



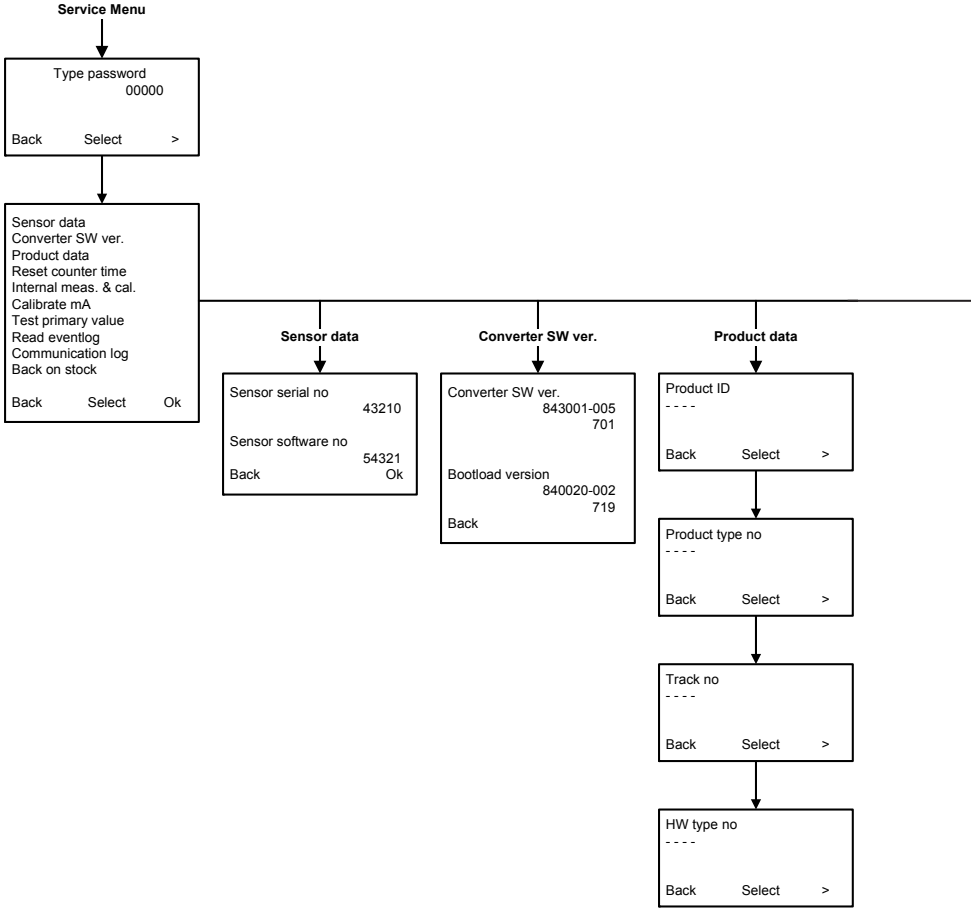
## Converter Setup Menu Overview (continued 7)



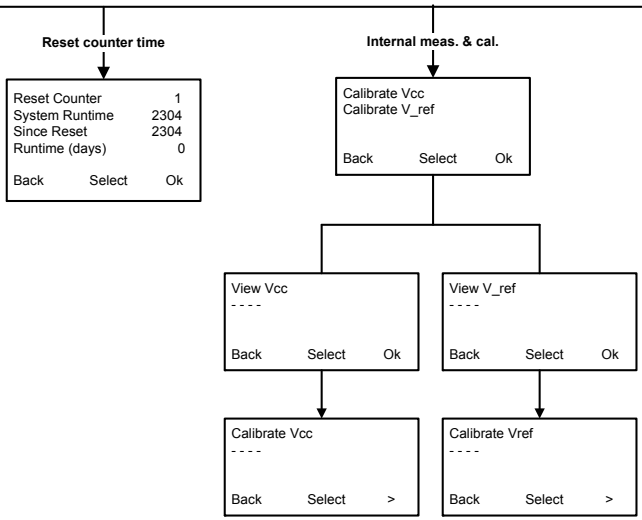
## Converter Setup Menu Overview (continued 8)



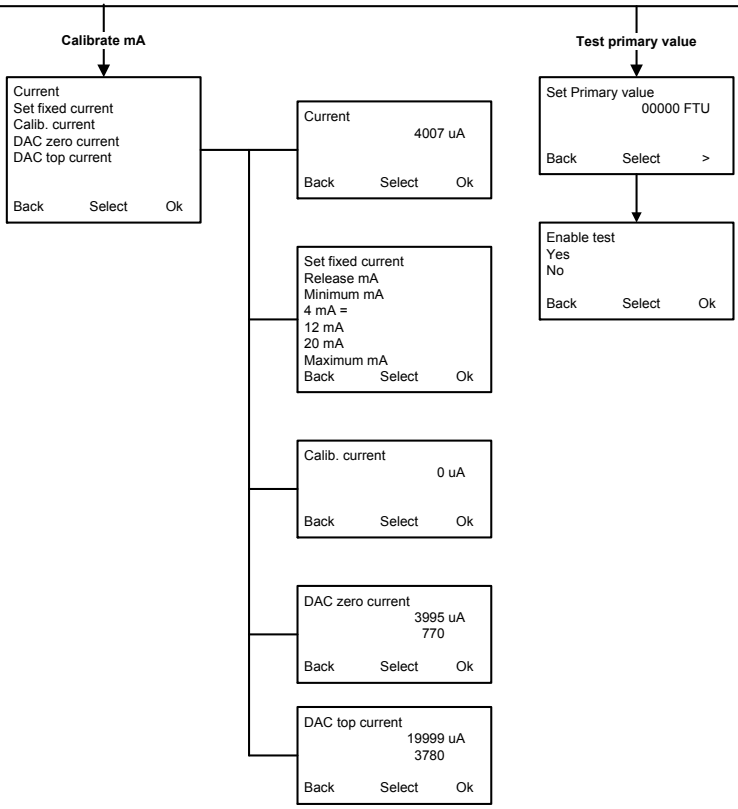
# Service Menu Overview



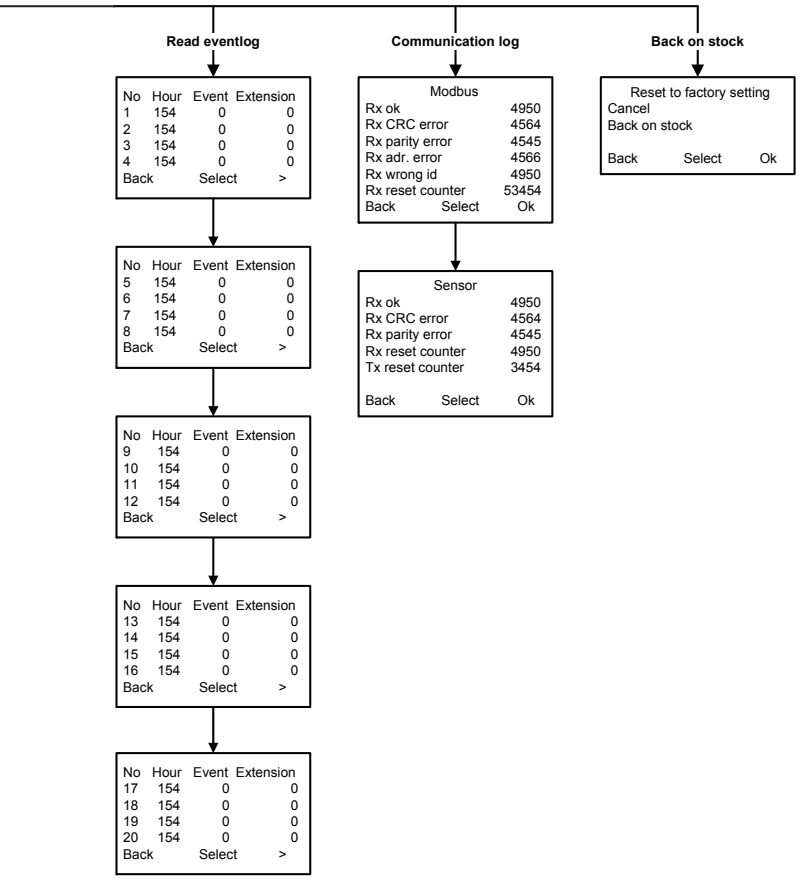
## Service Menu Overview (continued 2)



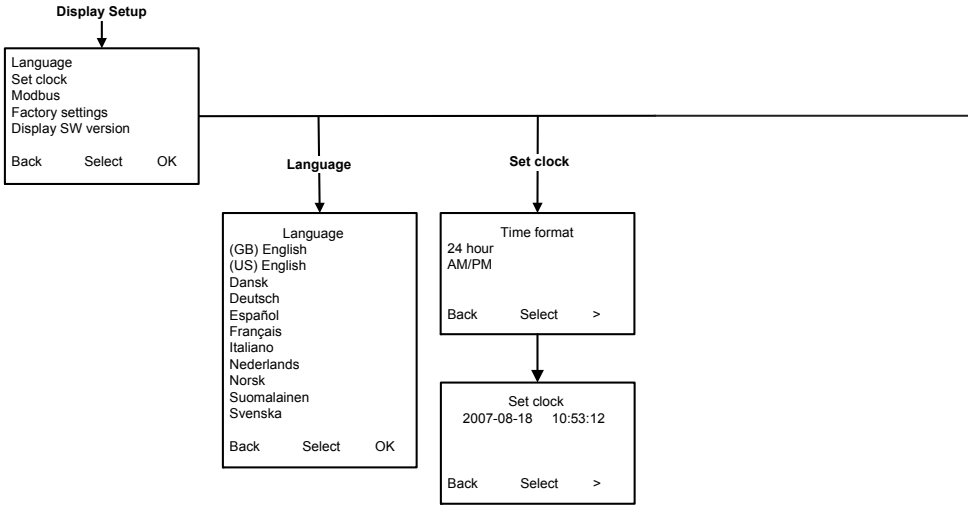
## Service Menu Overview (continued 3)



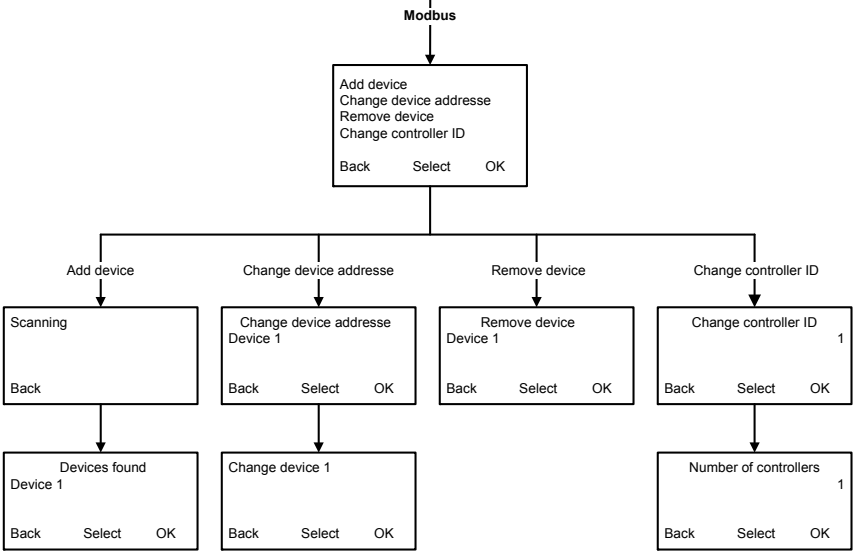
## Service Menu Overview (continued 4)



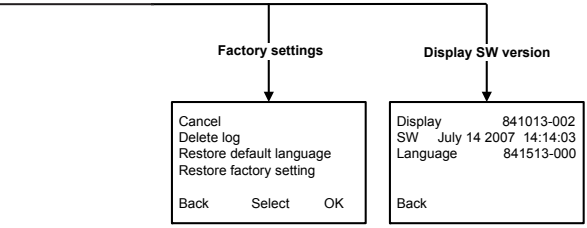
# Display Configuration Menu Overview



## Display Configuration Menu Overview (continued 2)



## Display Configuration Menu Overview (continued 3)




eof

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## Changes

As our products are developed continuously, we reserve the right to make any alterations without prior notice.

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